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A
RATIONAL ACCOUNT
OF THE
WEATHER,

Shewing the Signs of its several
Changes and *Alterations*, to-
gether with the Philosophical
Reasons of them.

MAINTAINED COLLECTED

Not only from Common Observations, but chiefly
from some of the most approv'd Authors, the
most celebrated Philosophers, and the most ju-
dicious Naturalists of this and former Ages,
as Dr. Halley, Dr. Mead, Dr. Woodward, Dr.
Lifter, Dr. Grew, Dr. Robinson, Mr. Dryden,
Mr. Deham, Mr. Morton, Mr. Handley, Dr.
Connor, Lord Bacon, Mr. Boyle, Mr. Ray, Dr.
Wallis, Dr. Plot, Monf. Ozanam, Monf. Pascal,
Seigneur Malpigi, Gassendus, Bartholin, Hip-
pocrates, Aristotle, Pliny, Aratus, Virgil, Horace,
Lucan, Seneca, and Varro.

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Chaplain of Merton College in OXFORD,
and Rector of Slapton in Northampton-shire.

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P R E F A C E.

AIR (or the different Temperature of it, by which we mean WEATHER) is one of the grand Concerns of Mankind. 'Tis what affects all sorts of People, Young as well as Old, Sick as well as Strong. Insomuch that even those very Persons that for want of Health, are lock'd up in close Rooms, feel either the Good or Ill Effects of the Weather. The Air being like Food, the better the more refreshing. Hence it is that the Sick Man is inquisitive what Weather it will be, and the Healthful, when he is to take a Journey, is willing to consult his Weather-Glass. And even those of the Fair Sex, are unwilling to stir abroad unless the Weather be like Themselves, and they like the Weather. How glad wou'd each Man be, in his particular State and Condition of Life, either to be ensur'd of Good Weather, or foretold of Bad? How glad wou'd the Country-Man be, to be assur'd of Good Weather to sow or reap his Corn and Hay? How glad wou'd the Traveller be, if he cou'd depend upon the Weather for such a determinate time?

To this end how frequently have Philosophers endeavour'd to make Schemes and Calculations of the Weather? And how even to this Day do your Astrologers and Philomaths pretend (tho' in vain) to their High Flights of Knowledge in their Prognostication of the Weather, from I know not what various Motions and Aspects, Trines, Squares, Sextiles, Conjunctions and Oppositions of the Planets with the Constellations, and with one another, and such like Astrological Cant and Jargon, which they are Annually troubling the World with, and with which glittering Starry

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*Notions they are perpetually dazzling and deceiving the Eyes of the Unthinking Vulgar, who have neither Opportunities nor Abilities of examining or enquiring into the Reasons of things. But how prettily soever these Men may talk of their Planets and Stars (for I know no difference between 'em) and however Solac'd and Jovial, Martial and Mercurial they may be at some times, yet doubtless they must take their Turns to be either Saturnine, Venereal, or Lunatick at other times, if (as they say) *Astra regunt Homines*, and if (as we say) *Semel insanivimus omnes*, especially when they are Talking out of their Sphere. However these Sciolists may value themselves upon their Planetary or Starry Knowledge, yet what Influence can such Distant Orbs shed upon Ours; So as to afford us any Rational or even Probable Conjectures in relation to the Weather? If they cou'd, we had long before this time had certain and infallible Schemes of the Weather deliver'd down to us, from the Experience of some of the best Astronomers, that have for many Years together, and with the utmost Exactness, kept their Diaries, and made their strictest Observations upon the Conjunctions and Oppositions of the Planets. Yet after all, how often has it been observ'd, That the very same Aspect of the very same Planet, has predict'd such a sort of Weather at one time, and the quite Contrary at another?*

Indeed it must be granted, that the Sun and Moon have Influence upon us, by reason of their Proximity, but as to the other Orbs (tho' all within the Verge of our Planetary System) they are notwithstanding in this respect Strangers to us, and the Stars far greater. And when we guess at the ensuing Weather from the Stars, 'tis only because, by getting a clearer or obscurer Sight of the Stars, we thereby discover the Clearness or Density of our Atmosphere, and so accordingly Prognosticate the Change and Alteration, or Continuance of Weather.

There-

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Therefore I think we need go no farther than this our Sublunary World, for the most probable and rational Conjectures in relation to the Weather, and deduce our Prognostications from the Animals and Vegetables of this our Terrene Globe, which is composed of Land, Water, and Air or Atmosphere: The Surface of which Earth is large enough, being 199444201 Miles, and the Solid Content of Air (according to the most Modern Calculation) 2341464949 Cubick Miles. The Distance of the Moon from the Earth 234304 English Miles; and the Distance of the Sun from the Earth 6485200 Miles; and the Distance of the other Planets, in this our Solar System, proportionably far greater.

And besides all this, there are several Ingenious Instruments invented, and improv'd, as Barometers, Hygrometers, and Thermometers, &c. by which Men of Ordinary Capacities may pretty easily Prognosticate the Temperature of the Air, and consequently the several Changes and Alterations of Weather. For Natural Causes do Naturally (i. e. according to the settled Order and Nature of things) produce Natural Effects, as a Dry Air (i. e. Air free from Vapours) will Naturally produce Fair Weather, and Humid Air, the contrary, unless hinder'd by Winds or the like. The same may be said of all other sorts of Weather, in respect of the several Degrees of Heat or Cold, Rarefaction or Condensation.

But not to insist too much upon Generals, it may not perhaps be thought improper to descend to Particulars, and give you a short but Physical Account of the different Phenomena of the Weather, together with the Original of Clouds, Rain, Hail, Snow, Winds, &c. Which may help to give light to the Prognostications of the Weather, which I shall give you in the ensuing Discourse. In which Natural Account of the several Sorts of Weather, I shall not altogether adhere to my own Opinion,

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Opinion but give you the Opinions of the most celebrated Virtuoso's, and more especially of the Reverend and Ingenious Mr. Derham, F. R. S. in his Phylico-Theology.

And first, concerning Clouds and Rain. Clouds and Rain (says Mr. Derham) are made of Vapours raised from Water or Moisture only. (So that he utterly excludes the notion of Dry, Terrene Exhalations or Fumes; Fumes being really no other than the Humid Parts of Bodies respectively Dry.) These Vapours are demonstratively no other than small Bubbles, or Vesiculæ detach'd from the Waters by the Power of the Solar, or Subterraneous Heat, or Both. And being lighter than the Atmosphere, are buoyed up thereby, till they become of an equal Weight therewith, in some of its Regions aloft in the Air, or nearer the Earth; in which those Vapours are form'd into Clouds, Rain, Snow, Hail, Lightning, Dew, Mists, and other Meteors.

In this Formation of Meteors, the grand Agent is Cold, which commonly, if not always, occupies the superior Regions of the Air; as is manifest from those Mountains which exalt their lofty Tops into the Upper and Middle Regions, and are always cover'd with Snow and Ice.

This Cold, if it approaches near the Earth, presently precipitates the Vapours, either in Dews; or if the Vapours more copiously ascend, and soon meet the Cold, they are then condens'd into Mistling, or else into Showers of Small-Rain, falling in numerous, thick, small Drops: But if those Vapours are not only Copious, but also as Heavy as our Lower Air it self (by means of their Bladders being thick and fuller of Water.) in this Case they become visible, swim but a little Height above the Earth, and make what we call a Mist or Fog. But if they are a Degree lighter, so as to mount Higher, but not any great Height, as also meet not with Cold enough to condense them, nor Wind to dissipate them, they then form an heavy, thick, dark Sky,

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Sky, lasting for several Weeks without either Sun or Rain. And in this Case, I have scarce ever known it to rain, till it has been first Fair, and then Foul, be the Wind where it will. And from what has been said, the Case is easily accounted for, viz. Whilst the Vapours remain in the same State, the Weather does so too. And such Weather is generally attended with moderate Warmth, and with little or no Wind to disturb the Vapours, and an heavy Atmosphere to support them, the Barometer being commonly high then. But when the Cold approaches, and by condensing, drives the Vapours into Clouds or Drops, then is way made for the Sun-beams, till the same Vapours, being by further Condensation, form'd into Rain, fall in Drops.

The Cold's approaching the Vapours, and consequently the Alteration of such dark Weather I have (says Mr. Derham) before-hand perceiv'd by some few small Drops of Rain, Hail, or Snow, now and then falling, before any Alteration has been in the Weather; Which I take to be from the Cold meeting some of the straggling Vapours, or the uppermost of them, and condensing them into Drops, before it arrives unto, and exerts it self upon the main Body of Vapours below.

I have (says he) more largely insisted upon this Part of the Weather, because it gives light to many other Phenomena of the Weather. Particularly we may hence discover the Original of Clouds, Rain, Hail, and Snow; that they are Vapours carried aloft by the Gravity of the Air, which meeting together so as to make a Fog above, they thereby form a Cloud: If the Cold condenses them into Drops, they then fall in Rain, if the Cold be not intense enough to freeze them; But if the Cold freezes them in the Clouds, or in their Fall thro' the Air, they then become Hail, or Snow.

As to Lightning, and other enkindled Vapours, I only observe, that they owe also their Rise to Vapours; but

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but such Vapours as are detach'd from Mineral Juices, or at least that are mingled with them, and are fir'd by Fermentation.

Another Phænomenon resolvable from what has been said is, Why a Cold, is always a Wet Summer, viz. because the Vapours rising plentifully then, are by the Cold soon collected into Rain.

We may observe farther, that about the Equinoxes we have oftentimes more Rain, than at other Seasons. The Reason of which is manifest, because in Spring, when the Earth and Waters are loos'd from the Brumal Constipations, the Vapours arise in great Plenty: And the like they do in Autumn, when the Summer Heats, that both dissipated them, and warm'd the Superior Regions, are abated; and then the Cold of the Superior Regions meeting them, condenses them into Showers of Rain, more plentiful than at other Seasons, when either the Vapours are fewer, or the Cold that is to condense them is less.

The Manner how Vapours are precipitated by the Cold, or reduc'd into Drops, I conceive to be thus; Vapours being no other than inflated Veliculæ of Water, when they meet with a Colder Air than what is contain'd in them, the contain'd Air is reduc'd into a lesser Space, and the watery Shell or Case, render'd thicker by that means, so as to become heavier than the Air, by which they are buoy'd up, and consequently must needs fall down. Also many of those thicken'd Veliculæ run into One, and so form Drops, greater or smaller, according to the Quantity of Vapours collected together. Concerning which, the learned and ingenious Dr. Halley has given us some curious Experiments, in our Philos. Trans. which may be met with together in Mr. Lowthorp's Abridg. Vol. II. p. 108. and 126. Mr. Sedileau also at Paris observ'd it for near Three Years: By whose Observations it appears, that what is rais'd in Vapours, exceeds that which falls in Rain.

And

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And by all their Observations it appears, that in the Winter Months the Evaporations are least, and greatest in Summer, and most of all in Windy Weather. Vid. Mem. de Math. Phys. Ann. 1692. p. 25.

If it be demanded what becomes of the Over-plus of Exhalations that descend not in Rain? I answer, they are partly tumbled down and spent by the Winds, and partly descend in Dews, which amount to a greater Quantity than is commonly imagin'd. Dr. Halley found the Descent of Vapours in Dews, so prodigious at St. Helena, that he makes no doubt to attribute the Origin of Fountains thereto. And I my self (says Mr. Derham) have seen, in a still, cool Evening, large thick Clouds hanging without any Motion in the Air, which in 2 or 3 Hours time have been melted down by Degrees, by the Cold of the Evening, so that not any of the least Remains of 'em have been left.

Concerning Winds; Ventus est Aer fluens, according to Seneca, and Aer agitatus, according to Aristotle. And as Wind is a Current of the Air, so (says Mr. Derham) that which excites or alters its Currents, may be justly said to be the Cause of the Winds. An Equipoise of the Atmosphere produces a Calm; But if that Equipoise be more or less taken off, a Stream of Air, or Wind, is thereby accordingly produc'd either stronger or weaker, swifter or slower. And divers things there are that may make such Alterations in the Equipoise or Balance of the Atmosphere, viz. Eruptions of Vapours from Sea or Land; Rarefactions and Condensations in one Place more than another; the falling of Rain, Pressure of the Clouds, &c.

Pliny (L. 2. c. 45.) tells us of a certain Cavern in Dalmatia call'd Senta, In quem (says he) dejecto levi pondere, quamvis tranquillo die, turbini similis emicat Procella. But as to Caves it is observ'd, that they often emit Winds more or less. Dr. Conner taking notice of this Matter, specifies these, In Reg-

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no *Neopolitano* ex immani *Sybillæ* antro tenuem *Ventum* effluentem percepi. *The like he observ'd at the Caves at Baix, and in some of the Mines in Germany, and in the large Salt-Mines of Cracow in Poland. Ubi (says he) opifices, & ipse fodinæ Dominus Andreas Morstin, Nobilis Polonus, mihi afferuerunt, quod tanta aliquando Ventorum Tempestas ex ambagiosis hujus Fodinæ recessibus surgere solebat, quod laborantes Fossore humi prosternebat, nec non Portas & Domicilia (quæ sibi in hac Fodinâ Artifices extruunt) penitus evertēbat.* Bern. Connor. Differt. Med. Phys. p. 33. Artic. 3.

And as great Caves, so great Lakes sometimes send forth Winds. So Gassendus says the Lacus Legnius does, è quo dum exoritur Fumus, Nubes haud dubiè creanda est, quæ sit brevi in Tempestatem sævissimam exoneranda. Gassend. Vit. Peiresk. L. 5. p. 417.

But the most universal and constant Alterations of the Balance of the Atmosphere, are from Heat and Cold. This is manifest in the general Trade Winds, blowing all the Year between the Tropicks from East to West: If the Cause thereof be (as some Ingenious Men imagine) the Sun's daily Progress round that Part of the Globe, and by his Heat rarifying one Part of the Air, whilst the cooler and heavier Air behind presses after. So the Sea and Land Breezes; and so in our Climate, the Northerly and Southerly Winds (commonly esteem'd the Causes of Cold and Warm Weather) are really the Effects of the Cold or Warmth of the the Atmosphere. Of which (says Mr. Derham) I have had so many Confirmations, that I have no doubt of it. As for Instance, it is not uncommon to see a warm Southerly Wind, suddenly chang'd to the North, by the fall of Snow or Hail; To see the Wind in a Frosty Cold Morning North, and when the Sun has well warm'd the Earth and Air, you may observe it to wheel about towards the Southerly Quarters; and

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and again to turn Northerly or Easterly in the Cold Evening. It is from hence also, that in Thunder-Showers the Wind and Clouds are oftentimes contrary to one another (especially if Hail falls), the Sultry Weather below directing the Wind one way, and the Cold above, the Clouds another way. I took notice (says Mr. Derham) upon March 10th 1710-11. (and divers others such like Instances I have had before and since) That the Morning was Warm, and what Wind stir'd, was West South-West, but the Clouds were Thick and Black (as generally they are when Snow ensues) A little before Noon the Wind vered about to North by West, and sometimes to other Points, the Clouds at the same time flying some North by West, some South-West: About One o' Clock it rain'd apace, the Clouds flying sometimes North-East, then North, and at last both Wind and Clouds settled North by West: At which time Sleet fell plentifully, and it grew very Cold. From all which I observe, First, That tho' our Region below was Warm, the Region of the Clouds was Cold, as the black Snowy Clouds show'd. Secondly, That the Struggle between the Warmth of Ours, and the Cold of the Cloudy Region, stop'd the Airy Currents of both Regions. Thirdly, That the falling of the Snow thro' our Warmer Air melted into Rain at first; but it became Sleet after the superior Cold had conquer'd the inferior Warmth. Fourthly, That, as that Cold prevail'd by degrees, so by degrees it wheel'd about, both the Winds and Clouds from the Northwards towards the South.

Hippocrates, L. 2. de Vict. Orat. Omnes Ventos vel à Nivè, Glacie, vehementi Gelu, Fluminibus, &c. spirare necesse judicat. Bartholin. de Usu Nivis. c. 1.

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PROG-



PROGNOSTICATIONS

Of the

WEATHER, &c.

Prognostications of Rainy Weather from Animals.



Creatures that live in the Open Air, must needs be suppos'd to have quicker Sense of it, than Men that live more within Doors, and especially *Birds* that live in the Air freest and clearest, and are apter by their Voices, and Flight, and other Motions, to discover their Sensations of it. Therefore those who have apply'd themselves to the Observation of the Signs and *Prognostications* of good or bad *Weather*, have laid down these following Rules:

Water-Fowls (says my Lord Bacon, in his *Nat. Hist. Cent. 9th*) such as *Sea-Gulls*, *Moor-Hens*, &c. when they flock and fly together from the Sea towards the Shores, foretell Rain and Wind.

Thus *Virgil*, in his *Georgicks*, Lib. 1. enumerating the Signs of Rain,

A

Curr

Prognostications of

*Cum medio celeres revolant ex Aequore Mergi,
Clamoreque ferunt ad Littora; cumque Marinæ
In sicco ludunt Fulicæ; notasque paludes
Deseruit, atque altam supra volat Ardea nubem.*

Which Mr. Dryden expresses thus,
When crying Cormorants forsake the Sea,
And stretching to the Covert wing their Way;
When sportful Coots run skimming o'er the
Strand, &c.

And contrariwise, *Land-Birds*, as *Crows*, and *Swallows*, &c. when they fly from the Land to the Waters, and beat the Waters with their Wings, do likewise foretell Rain and Wind. Thus *Pliny* in his *Nat. Hist.* Lib. 18. Cap. 79.

*Si Corvi captim vocem resorbeant, ventosum
Imbrem præagiunt---Et cum terrestres Volucres
contra Aquam clangores dabunt, persuadentes sese,
sed maxime Cornix.*

And thus *Lucan*, Lib. 5. Vers. 555.

*Quodque caput spargens undis, velut occupat Imbrē,
Instabili gressu metitur littora Cornix.*

The natural Reason of all which, is the Pleasure that both Sorts of *Birds* take in the Moistness and Density of the Air, and so love to be in Motion and upon the Wing. For it is no wonder that *Water-Fowl* do delight most in that Air which is most like (their natural Element) Water; and *Land-Fowl* also (many of 'em) take Pleasure in Bathing and Moist Air. For the same Reason likewise many *Birds* do prune their Feathers, and *Geese* do gaggle, and *Crows* seem to call upon Rain. All which is but the Pleasure they seem to take in the Relaxation of the Air. *Anseres* (says *Pliny*) *continuo clamore intempestivi. Vid. etiam Theophr. Lib. de Signis Temp. p. 124.*

The

Rainy Weather, &c. 3

The *Heron*, being a Water-Fowl, takes pleasure in the Air that is condens'd; and besides, being but Heavy of Wing, needs the help of the grosser Air, and for this reason flies low when the Air is gross and thickens into Showers. Thus *Lucan*, Lib. 5. Vers. 553.

----- *Quodque ausa volare*
Ardea sublimis pennæ confisa natanti.
 When watchful *Hérons* leave their watry Stand,
 And mounting Upward, with erected Flight,
 Gain on the Skies, and soar above the Sight.

The *Crows* flocking together in large Flights, holding their Heads upward as they fly, and crying louder than usual, is a Sign of Rain, as is also their stalking by Rivers and Ponds, and sprinkling themselves. Thus *Virgil*,

---- *Et è pastu decedens agmine magno*
Corvorum increpuit densis Exercitus alis.
Jam varias Pelagi Volucres, & quæ Asia circum
Dulcibus in Stagnis rimantur prata Cayltri,
Certatim largos humeris infundere rores;
Nunc caput objectare Fretis, nunc carrere in Undas,
Et studio incessum videas gestire lavandi,
Tum Cornix plena pluviâ vocat improba voce,
Et sola in siccâ secum spatiatur arenâ.

Huge Flocks of rising *Rooks* forsake their Food,
 And, crying, seek the Shelter of the Wood.
 Besides the sev'ral Sorts of *Wat'ry Fowls*,
 That swim the Seas, or haunt the standing Pools;
 The *Swans* that sail along to search their Food,
 Then lave their Backs with sprinkling Dews in
 vain,
 And stem the Stream to meet the promis'd Rain.
 The *Crow* with clam'rous Cries the Show'r de-
 And single stalks along the Desert Sands. (mands,

Thus likewise *Aratus*,

*Agmine cum denso circumvolitare videtur
Gracculus, & tenui cum stridunt gutture Corvi,
Convenit instantes prænoscere proinus imbres.*

The Chattering of *Swallows*, and their flying low about Lakes and Ponds (which they do to catch Flies, for the Air being clog'd with Vapours hinders the Ascent of Flies) denotes Rain. Thus *Virgil*,
Aut arguta Lacus circumvolitavit Hirundo.

The *Swallow* skims the River's watry Face.

Hence *Pliny* who had these hints from *Virgil*,
*Hirundo tam juxta Aquam volitans, ut penna sæpe
percutiat.* See *Theop. Lib. de Sig. Temp. p. 111.*

Other Signs of Rainy Weather are, when *Peacocks* cry much: When *Fowls* pick up their Feathers with their Bills: When *Birds* that usually perch upon Trees, fly to their Nests; *queque in Arboribus habitant, fugitantes in Nidis suis* --- says *Pliny*: When *Cocks* crow before their usual Hour, and *Hens* creep in clusters into the Dust: and *Owls* are clamorous; *Noctua in imbre garrula*, says *Pliny*.

And as *Birds* so *Beasts* likewise foretell Rain. When *Sheep* leap mightily, and push at one another with their Heads. *Pecora exultantia, & indecora lascivia ludentia*--- says *Pliny*.

When *Deers* fight, when *Asses* bray, or shake their Ears, or are much annoy'd with Flies. When *Foxes* and *Wolves* howl mightily: So *Virgil*,

*Et alte
Per noctem resonare, Lupis ululantibus, Urbes.*

When *Oxen* tied together raise their Heads, and lick their Snouts, When *Hogs* at play break and scatter their Food: *Turpes Porci alienos sibi manipulos lacerantes*--- says *Pliny*.

When *Cattle* leave-off feeding, and hasten to shelter under Hedges and Bushes, &c.

When

Rainy Weather, &c.

5

When *Cats* rub their Heads with their Fore-Paws (especially that Part of their Heads above their Ears) and lick their Bodies with their Tongues.

Beasts do generally take delight in a moist Air, and it makes 'em eat their Meat the better; and therefore *Sheep* will raise themselves betimes in the Morning to feed against Rain; and *Cattle*, and *Deer*, and *Rabbits* will feed hard before Rain, and *Heifers* will put up their Noses and snuff in the Air against Rain. Thus *Virgil*,

Aut Bucula Caelum

Suspiciens patulis captavit naribus Auras.

The *Cow* looks up, and from afar can find

The Change of Heav'n, and snuffs it in the Wind.

Hence *Pliny*,

Ex Bovis Caelum olfactantes, seque lambentes contra Pilum.

Fishes likewise in the Sea, or in Rivers, do often foretell Rain, by their playing towards the Top of the Water. The Reason of which is this (says my Lord *Bacon*) *Fish* love to keep from the Air as much as they can when it is Dry, and swim lower, and will not approach the Air till it is Moist.

* *Insects* also, and *Reptiles* foretell Rain. *Vermes-terreni erumpentes...* says *Pliny*: *Earth-Worms* will creep out of the Ground, and *Moles* will cast up more Earth, and *Fleas* bite more against Rain; and *Flies* are very troublesome often dashing against a Man's Face. *Bees* do not stir (or at least not far) from their Hives. *Ants* quit their Labour and hide themselves in the Ground: For these provident *Insects*, by a secret Instinct of Nature, finding the Air chang'd into Moistness and clog'd with Vapours carry their Eggs to a Place of dryer Secularity.

Thus

6 Prognostications of

Thus *Virgil*,

Sapius & tectis penetralibus extulit Ova

Angustum Formica terens iter---

The Careful *Ant* her secret Cell forsakes,

And drags her Eggs along the narrow Tracks.

Hence *Pliny*,

Segniter & contra industriam suam absconditæ Formicæ, vel concursantes, aut Ova progerentes.

Frogs will croak in Ditches more than usually against Rain, and *Toads* are heard to croak upon Eminences. Thus *Virgil*,

Et veterem in limo Rana cecinere querelam.

The *Frogs* renew the Croaks of their loquacious
Hence *Pliny*,--*Rana ultra solitum vocales.* (Race.

Aratus,

Si repetent veterem Rana per Stagna querelam.

Even in *Men*, Aches, Wounds, and Corns, are more troublesome, either towards Rain, or towards Frost: For the one makes the Humours of the Body to abound more, and the other makes 'em sharper: Both of which Extreame bring the Gout. *Mr. Ozanam* (in his *Mathemat. and Physic. Recreat.*) says, The very Body of all *Animals* and *Vegetables*, is (as it were) a Contexture of Hygrometers, Barometers, and Thermometers; for the Humours, with which the organiz'd Bodies are replenish'd, increase or decrease according to the different Dispositions of the Air.

A late ingenious Author (*Mr. Handley*, in his *Mechanical Essays on the Animal Oeconomy*, p. 354. &c.) says, --All the Changes that happen, either by Heat or Cold, to fermenting Liquors, are caus'd by the Alteration of either the Gravity or Spring of the Air: And it is for the same Reason that some People by their *Pains*, are so often Weather-wise. Their Blood being more rarify'd against wet Weather

ther or high Winds, will more forcibly press the sensible Membranes, whereby *Pains* will be felt which they felt not before.

If the Air be too Hot, especially if Moist withall, it disposes to malignant Feavers; and if the Heat be excessive (altho' without Moisture) it produces Diary Feavers, and sometimes what the Ancients call'd *Putrid*. Perspiration being too great, the Humours must remain Viscid and Dry, and so unfit for Circulation.

The Air being fill'd with Vapours, its Elasticity is weaken'd, the Fibres of the Body are relax'd, and the Pores obstructed; which will make the Blood apt to deposite a slimy Lensor on the Sides of the Capillary Arteries, and Orifices of the Glands, which will be apt to produce Agues, and more especially, if Cold be added to the Moisture of the Air, for Cold binds up and makes the Blood more compact, whereby its Motion becomes slower, and its Viscidity greater, and so produces this Distemper.

Prognostications of Rainy Weather from Solid Bodies.

Stones (especially *Marble*) when they Sweat (or rather only seem to Sweat) and *Boxes* and *Doors* (especially *Deal*) and *Pegs* of *Wood* when they draw and wind hard, are Signs of Wet Weather. Tho' the former be but from an Outward Cause, for that the *Stones* are so hard and solid as not to admit the Moisture of the Air, and therefore it only lies upon the Superficies of the *Stones*: But the latter is an Inward Swelling of the Body

of

of the *Wood* it self, caused by the admission of the Air thro' its Pores.

Monf. Ozanam (in his *Mathematick and Physick Recreations* p. 447.) says, The moist Vapours do readily insinuate into *Wood*, especially that which is light and dry, as being extreamly Porous; inso-much that they are sometimes made use of for dilating and breaking the hardest Bodies, particularly Mill-stones; For when a Rock is cut into a Cylinder, they divide that into several lesser Cylinders, by making several Holes round the great Cylinder, at distances proportional to the design'd Thickness of the Mill-stones; and filling them with as many Pieces of *Sallow Wood* dried in an Oven; For when wet Weather comes, these *Wedges* or Pieces of *Wood*, are so impregnated with the moist Corpusculums of the Air, that they swell and break, or separate the Cylindrical Rock into several Mill-stones.

The Hardest and most Solid *Wood* will swell by the Moisture of the Air, as appears by the Difficulty of shutting our Doors and Windows in Wet Weather.

The Humidity of the Air insinuates it self not only into the *Wood*, but likewise into the *Hardest Bodies* which are not destitute of Pores, and especially into the Light Bodies which take up a great Space: And hence it is, that Mr. *Paschal* (in his Treatise of the *Aequilibrium of Liquors*.) says, That if a Pair of Scales continues in *Aequilibrio* when loaded with two equal Weights, one of which is of a more voluminous Substance than the other, as *Cotton* or any Body of a lesser Specifick Gravity, the Balance will depart from its *Aequilibrium*, and incline to that more voluminous Weight when the Air is Condensed with Vapours: For the Watry Particles, with which the Air is loaded, will in-
sinuate

insinuate themselves more readily into this, than into the other Weight, which being less Voluminous, must needs have lesser Pores.

But of all the Bodies that are apt to imbibe the Moisture of the Air, I know of none more such than the *Salt* of any Hot Plant, or *Salt-petre* well Calcin'd, which, upon the least Moisture of the Air, melts readily into Water, so as to weigh 3 or 4 times as much as before. For this is the Common Quality of almost all *Salts*, that they are easily impregnated with the Bodies contain'd in the Air; and accordingly when the *Salt* at a Table is Moistur than ordinary, we take it for a certain Sign of approaching *Rain*, as denoting that the Air is loaded with Moist Vapours, which will quickly dissolve into *Rain*.

Prognostications of Rainy Weather from the Planets and Stars.

IF the *Sun* at its Rising looks Red, and Broader than usual, then many Moist Vapours are gathering from the Sea, the Air is thickning, and the *Sun beams* diffus'd in it, makes the Face of that Planet show greater than usual, and in a little time you'll see the Clouds muster, and spread the Face of the Heavens, and the Air condensing into a Water Body: And if this happen in Hot Weather, viz. Summer or Autumn, violent Showers will fall, but not of long Continuance; but if in Winter or Spring, settled Rains, but more moderate.

Thus *Virgil*, *Georg. Lib. 1.*

*Sol quoque & Exoricens, & cum se condit in Undas
Signa dabit: Solem certissima Signa sequuntur,
Et quæ Mane refert, & quæ surgentibus Astris,*

B

Ille

*Ille ubi Nascentem maculis variaverit Ortum
Concavus in Nubem, medioque refugerit Orbe ;
Suspecti tibi sint Imbres. Namq; arguet ab Alto
Arboribusque satisque Notus Pecorique sinister.*

Above the rest, the *Sun*, who never lies,
Foretells the Change of Weather in the Skies :
For if he rise, unwilling to his Race,
Clouds on his Brow, and Spots upon his Face ;
Or, if thro' Mists he shoots his fullen Beams,
Frugal of Light, in loose and stragling Streams ;
Suspect a drizzling Day, with Southern Rain,
Fatal to Fruits, and Flocks, and promis'd Grain.

Pliny, Nat. Hist. Lib. 18. C. 35.

*Sol concavus Oriens pluvias prædicit : idem Ventos,
cum ante Exorientem cum Nubes rubescunt : quod si
& nigræ rubentibus intervenerint, & Pluvias. Cum
Orientis & Occidentis radii rubent, coire Pluvias.*

It has likewise been observ'd by those that have
had long Experience of the Weather, that if the
Sun rises with a Blewish Circle inclining to White,
the Air is gross and condensed, and Rain will
soon fall.

Or if the *Sun* rises Pale, and the Sky of a Dusky-
Red in the Morning, an Over-casting will soon
ensue, and Rain quickly follow upon it, attended
with Whisking Winds.

Thus *Pliny, Nat. Hist. Lib. 18. Cap. 35.*

*Si in Exortu Solis fiet, ita ut rubescant Nubes,
maxima ostendatur Tempestas. Si non ambibunt, sed
incumbent, à quocunque Vento fuerint, eam por-
tendent.*

If the *Sun* rises in a Misty-muddy Colour, or in
a Black Cloud, and diffuses its Rays Palish towards
the North and South, it denotes Rain. So *Pliny* :
*Si in Exortu Solis spargentur Nubes partim ad Au-
strum, partim ad Aquilonem, pura circa eum Sere-
nitas sit licet, Pluviam tamen Ventosq; significabunt.*

Ita

*Ita Festus Avienus, p. 69. De Sole.
Sed non ora Cavo similis, medioque recedens
Ore quasi, vel si radios discingitur ultro
Figat ut Australem porrecti Sidere partem,
Ac Boream rigidi jaculetur liminis ignem,
Et Vento & Pluviis reparata luce carebit.*

And as for the *Sun* Setting, it has been observ'd,
That if he Sets under a thick Cloud, there will
be Rain next Day: or, if it rains immediately,
there will be a great deal of Wind next Day; which
is almost the constant Consequence of a Pale-set-
ting *Sun*.

Thus *Pliny*. *Si in Occasu Solis pluet, aut radii
in se Nubem trahent, asperam in proximum Diem
Tempestatem significabunt.*

A Red Sky at *Sun-rising* is a Sign of Rain; but a
Red Sky where the *Sun* sets, is a Sign of Fair Wea-
ther. Indeed if the Sky be Red at a great Distance
from the Part where the *Sun* sets, as in the East,
there will be either Rain or Wind the next Day.

Virgil's Remarks on the setting *Sun* are these
(*Geor. L. 1.*)

*Hoc etiam, emenso cum jam decedet Olympo,
Profuerit meminisse magis. Nam sæpe videmus
Iplius in vultu varios errare Colores.
Cæruleus Pluviam denunciat, Igneus Euros.
Sin maculæ incipient Ruilo immiscerier Igni,
Omnia tum pariter Vento Nimbisque videbis
Fervere—*

But more than all, the setting *Sun* survey,
When down the Steep of Heav'n he drives the
For oft we find him finishing his Race (Day.
With various Colours erring on his Face;
If fiery *Red* his glowing Globe descends,
High Winds and furious Tempests he portends:
But if his Cheeks are swoln with livid *Blue*,
He bodes wet Weather by his Watry Hue:

If Dusky Spots are vary'd on his Brow,
And, streak'd with Red, a troubl'd Colour shew;
That sullen Mixture shall at once declare
Winds, Rain, and Storms, and Elemental War.

Pliny's farther Remarks on the Sun's Rising and Setting, are these, Lib. 18. c. 35. *Nat. Hist.*

Si in Ortus Solis aut in Occasu contracti cernentur Radii, Imbrem significabunt.

Cum Oriente radii non illustres eminebunt, quamvis circumdati Nube non sint, Pluviam portendunt.

Si Nubes Solem circumcludent, quanto minus luminis relinquent, tanto turbidior Tempestas erit. Si vero etiam duplex Orbis fuerit, eo atrocior.

Si Oriens Sol cingetur Orbe, ex qua parte is se aperit, expectetur Ventus.

Si in Exortu longè radios per Nubes porriget, & medius erit inanis, Pluviam significabit.

Si ante Ortum Radii se ostendent, Aquam & Ventum.

Si circa Occidentem candidus Circulus erit, Nebris levem ostendent Tempestatem: Si Nebula, vehementiorem: Si candente Sole, ventum: Si ater Circulus fuerit, ex qua Regione is ruperit se, Ventum magnum.
So much for the Sun.

The Moon likewise has its Signs. Thus a Pale Moon is the forerunner of Rain: Red, of Wind: Clear, of fine Weather.

Pallida Luna pluit, rubicunda flat, alba serenat.

Si rubicunda exorta est Luna, Ventos; si nigra, Pluvias portendere creditur, says Pliny, L. 18. c. 79.

Virgil, Georg. Lib. 1.

Luna revertentes cum primum colligit ignes,

Si nigrum obscuro comprehenderit aëra Cornu.

Maximas Agriculis Pelagoque parabitur Imber.

At si Virgineum suffuderit ore ruborem,

Ventus erat. Vento semper rubet aurea Phœbe.

When

Rainy Weather, &c. 13

When first the *Moon* appears, if then she shrouds
Her Silver Crescent, tip'd with sable Clouds,
Conclude she bodes a Tempest on the Main,
And brews for Fields impetuous Floods of Rain.
If the *Moon's* Face with fiery Flushing glow,
Expect the ratling Winds aloft to blow.

When the *Moon* is compass'd about with a very large Circle, or is dim and misty, then Wind or Rain follows, or Snow speedily, or likely within 24 Hours.

If the *Moon's* Horns are blunt at its first Rising, at, or within 2 or 3 Days after the Change, it denotes Rainy Weather for that Quarter; but seasonable Weather the other Quarters. In *Quinta* (says *Pliny*) *Cornua Lunæ obliqua, Pluviam: erecta & infesta Ventos semper significant: Quarta tamen maxime— Si Quartam orbis rutilus cingit, Ventos & Imbres præmonebit.*

Nascens Luna (says *Varro*) *si Cornu superiore obatro (vel obatrato) surget, Pluvias decrescens dabit: Si inferiore, ante Plenilunium: Si in media nigritia illa fuerit, Imbrem in Plenilunio.*

An Iris round the *Moon*, is likewise a Sign of Rain, with a South Wind.

Nor are the *Stars* (tho' at so great a Distance) destitute of their Signs. The *Stars* seeming bigger than usually, pale, dull, and not twinkling, shew the Air is condensing to Rain, which will soon fall.

The *Stars* appearing more Bright and Blazing than ordinary in Summer, is a Sign of great Winds and Rain.

Many *Stars* appearing in the Night and seeming a greater Number than usual, and the Wind at East in Summer, foretells sudden Rain.

Prog-

Prognostications of Rainy Weather by the Clouds.

MAny small *Clouds* at North-West, in the Evening, shew that Rain is gathering and will suddenly fall.

Clouds appearing like Rocks or Towers, signify great Showers.

If small *Clouds* grow bigger and bigger in an Hour or Two, they signify a great deal of Rain. On the contrary, if great *Clouds* waste off and grow smaller and smaller, they signify fair Weather.

In Summer (says M. Ozanam) we apprehend a future Storm, when we see little Black loose *Clouds* lower than the rest, wandring to and fro; when at Sun-rise we see several *Clouds* gather in the West; and on the other hand, if these *Clouds* disperse, it speaks Fair Weather.

When the *Sun* looks double or triple through the *Clouds*, it prognosticates a Storm of long Duration.

Two or Three discontinu'd and speckled Circles or *Rings* round the Moon, presage a great Storm.

Pliny (in his *Nat. Hist.* L. 18. c. 79.) says, *Nubes ab Austro imbres portendent.*

Nubes vehementius atræ ab Oriente, in noctem Aquam minantur: Ab Occidente, in posterum diem.

Si Nubes, ut vellera Lanæ, spargentur multæ ab Oriente, Aquam in triduum præsagient.

Cum in cacuminibus Montium Nubes confident, byemabit.

Prog-

Prognostications of Rain by the Rain-Bow.

IF after a long Drought the *Rain-Bow* appears, it signifies Rain. But if it appears after a long time of Wet, it signifies Fair Weather.

If it appears very Big, it signifies much Wet: But if very Red, Wind withall.

If it appears in the Morning, it signifies small Rain, and presently after Fair Weather.

From that Part the *Rain-Bow* first begins to break, or vanish, Winds will arise and bring great Showers.

If the *Rain-Bow* vanishes altogether, Fair Weather will ensue.

If it be broken in many Parts, Tempestuous Winds are gathering in the Air.

If (after it appears) the Colours grow grosser and darken, Rain is gathering; If lighter and the Colours fairer, the contrary.

If two *Rain-Bows* appear together, it denotes fair Weather for the Present, and Rain 2 or 3 Days after.

A *Rain-Bow* in the East (says Monf. Ozanam) is a Sign of great Rain, especially if it be of a Bright lively Colour. A *Rain-Bow* in the West presages an indifferent quantity of Rain and Thunder: But a *Rain-Bow* in the East in the Evening, predicts Fair Weather, and if its Colour is Lively and Red, it foretells Wind.

Thus Seneca, lib. 1. *Nat. Quæst.* c. 6. p. 836.

—Et bibit ingens Arcus (ut ait Virgilius) cum adventat Imber. Sed non easdem (undecunque apparuit) minas affert. A Meridie ortus magnam vim Aquarum vehit. — Si circa Occasum resulsit, ro-rabit, & leviter impluet. Si ab Ortū, circa-ve sur-rexit, Serena promittit.

Signs

Signs of Rain ceasing.

WHEN a Shower comes suddenly, 'tis like to be Fair Weather again in the space of Half an Hour or an Hour: For there is no *Rain* continues long that comes Suddenly; *Nullum violentum est diuturnum.*

Also, if it begin to *Rain* an Hour or Two before Day, it is like to be Fair before Noon, and to hold so all the rest of the Day: But if begin to *Rain* an Hour or Two before Sun-rising, it is like to *Rain* most part of the Day after, except the Rain-Bow be seen before it Rains.

Or, when the Air grows thick by degrees, and the Sun shines duller and duller, till it shines not at all; Or the Moon or Stars by Night: Then it is like to *Rain* 6 Hours usually.

Also, when it begins to *Rain* from the South with a High Wind for 2 or 3 Hours; and then the Wind falls (and it continue *Raining* still) then it is like to *Rain* for 12 Hours or more; and usually *Rains* till a strong Wind arises to clear the Air. These long *Rains* seldom hold above 24 Hours, or seldom happen above Once a Year.

Prognostications of the Weather by Mists.

IF the *Mists* arise out of Ponds and Rivers, and there vanish away, it signifies Fair Weather. But if from thence they arise to the Tops of the Hills, it is like to be Rainy suddenly, either the same Day, or commonly within 2 or 3 Days.

If

If before Sun-rising it be a General *Mist* (both on the Hills and Vales) near the Full-Moon, it signifies Fair Weather. But if such a *Mist* be in the New of the Moon, it signifies Rain in the Old of the Moon: But in the Old of the Moon, it signifies Rain in the New.

If (says Monf. *Ozanam*) after Sun-set, or before Sun-rise, you observe a white Vapour rising upon Waters, or Marshes or Meads, you'll have Fair Warm Weather next Day.

Indeed I look upon *Mists* as only thinner, un-compacted, and more rarify'd Clouds which hang upon the Earth: And tho' we don't call 'em so whilst we are involv'd in 'em, yet as soon as they are a little elevated and drawn up, we immediately call 'em Clouds: And oftentimes they are by the Cold in the Atmosphere, and at no great Distance from us, so condens'd, that they suddenly return upon us in great Show'rs of Rain: Hence 'tis a common Observation, that when a *Mist* is drawn up to the Tops of the Hills, 'tis a Sign of Rain; But when we see the *Mists* driven along the Valleys, the *Sun* rarifying and dispersing them, 'tis a Sign of fair Weather. For as *Mists* are nothing else but thin and rarify'd Clouds, so are Clouds nothing but thick, condens'd, and compacted Vapours or *Mists*; which when so far condens'd as to become too ponderous to be supported by the Air, fall down upon us in Rain, Hail, or Snow.

Prognostications of the Weather by Vegetables.

TIS very pretty to observe the Methods of Nature, in guarding the insensitive Creatures

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tures in the *Vegetable Kingdom*, against Harms and Inconveniencies. I have observ'd that many, if not most of 'em, do expand their Flowers and Down in Warm Sun-shiny Weather, and again close them towards Evening, or in Rain, especially at the Beginning of Flowering, when the Seed is young and tender; It is manifest in the Down of the *Dandelion*, and other Downs; and eminently in the Flowers of *Pimpernel*, the opening and shutting of which, are the Country-man's Weather-wiser; whereby *Gerard* says, he foretells what Weather shall follow the next Day; for (says he) if the Flowers be close shut up, it betokens Rain and foul Weather; contrariwise, if they be spread abroad, Fair Weather. *Ger. Herbal. B. 2. Ch. 183. p. 494.*

Likewise the *Trefoil* (says my Lord Bacon) swells in the Stalk against Rain, and so stands more upright; for by Wet, Stalks do erect, and Leaves bow down. *Trifolium* (says *Pliny*) *inborrescere, & folia contra Tempestatem subrigere certum est.* *Pliny* likewise mentions the *Wincopipe*. And so does my Lord Bacon: There is (says he) a small Red Flower in the Stubble-Fields, which Country-people call the *Wincopipe*, which if it open in the Morning, you may be sure of a Fair Day to follow.

The Natural Reason of which (according to *Monf. Ozanam*) is this, *Plants* are a sort of natural Hygrometers, being compos'd of an infinite Number of Fibres, *Trachææ* or Air-Vessels, which are like so many Canals or Pipes, thro' which the Moisture of the Air, as well as the Juice of the Earth, is convey'd into all its Parts.

Plantæ igitur (says *Malpigi*) *cum sint Viva-
tia (ut conjecturari fas est) Visceribus infixæ Terræ,
ab hac, seu potius ab Aquâ & Aere, commixtis &
percolatis à Terrâ, Respirationis suæ materiam reci-
piunt,*

Weather by Vegetables. 19

piant, ipsarumque Tracheæ ab halitu Terræ, extremas radices subingresso, replentur.

These *Tracheæ* or *Air-Vessels*, are visible, and appear very pretty in the Leaf of *Scabious*, or the *Vine*, by pulling asunder some of its principal Ribs, or great Fibres; between which may be seen the spiral *Air-Vessels* (like Threads of Cobweb) a little uncoiled: A Figure whereof Dr. Grew has given us in his *Anat. Plant.* Tab. 51. 52.

Vid. *Malpig.* Op. *Anat. Plant.* p. 15.

Dr. Grew's *Ant. Plant.* Lib. 3. c. 3. §. 16. &c.

Mr. Ray's *Hist. Plant.* L. 1. c. 4.

Signs of Fair Weather.

THE Sun rising in the Morning fair and bright, and setting at Night blushing, without Spots or black Clouds near it, is one Sign of fair Weather. Thus *Pliny*, L. 18. c. 35.

Sol purus Oriens, atque non fervens, serenum Diem nunciat. Si ☿ Occidet pridie serenus, ☿ oritur, tanto certior fides Serenitatis—

Si circa Solem Occidentem rubescant Nubes, Serenitatem futuræ Diei spondent—

Si ab Ortu Solis repellentur Nubes, ☿ ad Occasum abibunt, Serenitatem denunciabunt.

Si Sol Oriens cingetur Orbe, ☿ postea totus defluxerit equaliter, Serenitatem dabit.

The Moon, when she is 3 or 4 Days old, and has her Horns sharp, and pointed very bright, predicts fair Weather till the Full, if not all the Month.

A bright or shining Circle about the Moon, when at Full, promises fair Weather for many Days.

nor always when they are alive, but give Light according to this Diffusion of this Spirit, and the Protusion of their Luminous Parts. These *Insects* are the Husbandmen's Monitors to bring in their Harvest; as *Virgil* says,

*His tandem studiis Hyemem transegimus illam.
Ver rediit, jam sylva viret, jam Vineæ frondet,
Jam spicata Ceres, jam cogitat borrea Messor,
Splendidulis jam nocte volant Lampyrides alis.*

Other Signs of fair Weather we have from *Birds*, as the *Larks* rising very High, and continuing singing for a long time. The *Kite* also flying aloft, shows Fair and Dry Weather. The Reason of which (says my Lord *Bacon*) may be this, Because the *Kite* mounts most into the Air of that Temper wherein he delights: For this aspiring *Bird* affects not so much the Grossness of the Air, as the Cold and Freshness of it: For being a *Bird* of Prey, and therefore Hot, he delights in the fresh Air, and many-times flies against the Wind, as *Trouts* and *Salmons* swim against the Stream. And yet it is true also, that all *Birds* find an Ease in the Depth of the Air, as Swimmers do in a deep Water. And therefore when they are aloft, they can uphold themselves with their Wings spread, scarce moving them. The like *Pliny* observes of the *Crane*. *Grues silentio per sublime volitantes, Serenitatem præagunt.*

Swallows likewise flying High presage Fair Weather. And *Plovers* or *Lap-wings* flying High, and then Low, making also continual Cries, foreshow Warm Weather. The like *Virgil* elegantly remarks of the *Ravens*:

*Tum liquidas Corvi presso ter gutture voces
Aut quater ingeminant; & sæpe cubilibus altis
Nescio quâ præter solitum dulcedine leti
Inter se foliis strepitant: Juvat imbribus ætæ
Progeniem parvam dulcisque revivere nidos.*

Haud

*Haud equidem credio, quia sit Divinitus illis
Ingenium, aut rerum Fato Prudentia major.
Verum, ubi Tempestas & Cæli mobilis humor
Mutavere vias, & Jupiter uvidus Austris
Densat, erant quæ rara modo, & quæ densa relaxat;
Vertuntur Species Animorum, & pectora motus
Nunc alios, alios, dum Nubila Ventus agebat,
Concipiunt. Hinc ille Avium concentus in Agris,
Et lætæ Pecudes, & Ovantes gutture Corvi.*

Which Mr. Dryden turns thus :

Then thrice the Ravens rend the liquid Air,
And croaking Notes proclaim the settled Fair.
Then round their Airy Palaces they fly
To greet the Sun; and seiz'd with secret Joy
When Storms are over-blown, with Food repair
To their forsaken Nests, and callow Care.
Not that I think their Breasts with heav'nly Souls
Inspir'd, as Man, who Destiny controuls.
But with the changefull Temper of the Skies,
As Rains condense, and Sun-shine rarifies;
So turn the Species in their alter'd Minds,
Compos'd by Calms, and discompos'd by Winds.
From hence proceeds the Birds harmonious Voice,
From hence the Crows exult, and frisking Lambs
rejoice.

Owls Hooting much is another Sign of Fair Weather; tho' Owls Hoot much both in Wet and Dry Weather, with this Difference, in Wet their Hooting is more Clamorous (*Noctua in imbre gar-rula*, says *Pliny*), but in Fair Weather, more Easy and Sedate, as *Virgil* says,

*Solis & Occasum servans de culmine summo
Nequicquam seros exercet Noctua cantus.*

And Owls that mark the Setting-Sun declare
A Star-light Evening, and a Morning Fair.

Also *Halcyons* and *Coots*, and other Sea-Fowl, leaving the Shoars and flocking to Sea, is another Sign of Fair Weather.

Thus

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Thus *Virgil* again,

*Non tepidum ad Solem pennas in littore pandunt
Dilectæ Thetidi Alcyones*——

The filmy *Gossamer* now flits no more,

Nor *Halcyons* bask on the short Sunny Shoar.

And *Pliny* says, L. 2. c. 47. L. 18. c. 26. L. 10. c. 32.

Alcedo septem Diebus nidificat in Mari, & septem postea fætificat; Qui Dies HALCEDONII dicuntur, quibus Diebus Mare placidum & navigabile est. Hoc ergo Signum est, cum Alcedones non pandunt alas.

And not only *Birds*, but *Fish* also, by their frequent Rising and Flurting upon the Surface of the Water: And *Cattle* feeding eagerly without looking about 'em, do foretell Fair Weather. *Delphini* (says *Pliny*) *turbato Mari spargentes Aquam, Tranquillitatem præsagiunt.*

Prognostications of the Weather by the Winds.

THE *Winds* are the Cause of the most sudden and extraordinary Alterations of the Gravity of the Air; the Nature of the *Winds* is such, that by the Experience we have of 'em, we may thence predict (very near) the Weather that will ensue for 2 or 3 Days after. We know (for Example) in this Climate, that a *South Wind* generally brings Rain, and a *West Wind* yet more (which is the predominant *Wind* here, because the Ocean lies on that Side); That the *North Wind* brings Fair Weather, as well as the *East Wind*, which does not last so long as the former. Therefore the *North-East*, and *South-West* Winds are the only Winds that I shall insist upon at present.

It has been an Observation made by some, that have been very Curious Observers of the Weather for

Weather by the Winds. 25

for many Years, That in 8 Years time there is as much *South* and *West* Wind, as *North* and *East* Wind; and consequently as many Wet Years as Dry Years.

Now I will give you a Rule how you may know when the *Wind* will sit in one of these 2 Points for 2 or 3 Months together, for the most part.

First, for the *North-East* Wind; When the *Wind* turns to this Point, and continues 2 Days without Rain, and turns not *South*-ward the 3^d Day, nor Rains, then it is like to continue *North-East* for 8 or 9 Days without Rain, and then return into the *South*.

If the *Wind* turn out of the *South* to the *North-East* again, and continue in that Point without Rain for 2 Days, and turn not *South* the 3^d Day, nor Rain the 3^d Day, it is like to continue *North-East* for 2 Months, or 3 for the most part. The *Wind* will finish these Turns towards the *North* in 3 Weeks time.

Secondly, for the *South-West* Winds: When the *Wind* has been in the *North* for 2 Months or more for the most part, and comes to the *South*, usually there are 3 or 4 Fair Days at first, and then the 4th or 5th Day comes Rain, or else the *Wind* turns *North*, or continues Dry still.

If it return to the *South* within a Day or Two without Rain, and turn *North*-ward with Rain, and return into the *South* the 1st or 2^d Day as before, 2 or 3 times together after this sort, then it is like to be in the *South* or *South-West* 2 or 3 Months together for the most part, as it was in the *North* before. The *Wind* will finish these Turns in a Fort'night.

I mention not the *East* or *West* Winds, because the Rain comes usually from the *South*, or in the Shifting of the *Wind* from the *South* to the *North*.

As for the Droughth, the *Wind* is for the most part *North-East*.

If it be fair Weather out of the *South* for a Week together (which is not usual) it is like to be great Droughth, when it has been a long time of Rain out of the *South* before.

Usually the *Wind* turns from the *North* to the *South* quietly without Rain, but comes back again into the *North* with a strong *Wind* and Rain. The greatest *Winds*, which blow down Houses and Trees, usually come by the turning of the *Wind* out of the *South*, by the *West*, into the *North*, which drives away Rain, and clears the Air.

Pliny (in his *Nat. Hist.* L. 2. c. 47. and L. 18. c. 34.) gives this Account of the Winds.

Auster *Africae* serenus, Aquilo nubilus. Omnes Venti vicibus suis spirant. De ratione eorum Menstrua, Quarta maxime Luna decernit— Austro majores flatus eduntur quam Aquilone: quoniam ille infernus ex imo Maris spirat, hic summo. Ideoque post Austros noxii praecipue Terræ-motus. Noctu Auster, interdiu Aquilo vehementior. Et ab Ortus flantes diuturniores sunt ab Occasu flantibus. Septentriones impari ferè desinunt numero— Sol & auget, & comprimit flatus. Auget exorients Occidensque, comprimit Meridianus æstivis temporibus. Itaque medio Diei aut noctis plerumque sopiuntur: qui aut nimio frigore, aut Æstu, solvuntur. Et imbris Venti sopiuntur.

Vulturnus (*Anglicè* South-East Wind) si à serenâ Cæli Parte cæperit flare, non durabit in noctem: At Subsolanus (*East-Wind*) in majorem partem noctis extenditur. Quisquis erit Ventus, si fervidas sentietur, pluribus diebus permanebit. Aquilonem (*North-West Wind*) prænuñciat Terra siccenscens repente, Austrum (*South-Wind*) humescens rore occulto.

Prog-

Prognostications of Windy Weather from the Moon.

CORNA Lunæ (says *Pliny* in his *Nat. Hist.* L. 18. c. 79.) Septentrionale acuminatum atque rigidum, illum præſagit Ventum: inferius, Austrum: Utraque recta, noctem Ventosam. Si Quartam orbis rutilus cingit, Ventos & Imbres præmonēbit.

Varro's Opinion is this, Si Quarto die Luna erit directa, magnam Tempeſtatem in Mari præſagiet, niſi Coronam circa ſe habebit, & eam ſinceram: quoniam illo modo non ante Plenam Lunam biematurum oſtendit.

Si Plenilunio per dimidium pura erit, dies ſerenos ſignificabit: ſi rutila, Ventos: nigreſcens, Imbres.

Si caligo orbis nubem incluſerit, Ventos, qua ſe ruperit: ſi gemini Orbes cinxerint, majorem Tempeſtatem. Et magis, ſi tres erunt, aut nigri, interrupti atque diſtracti—

Si plena circa ſe habebit Orbem, ex quâ parte is maximè ſplendebit, ex eâ Ventum oſtendet: Si in Ortu Cornua craſſiora fuerint, horridam Tempeſtatem. Si ante Quartam non apparuit, Vento Favonio flante, Hyemalis toto Menſe erit. Si Decimo ſexto vehementius flammea apparuerit, aſperas Tempeſtates præſagiet.

Sunt & ipſius Lunæ octo Articuli, quoties in angulos Solis incidit, pleniſque inter eos tantum Obſervantibus Præſagia ejus, i. e. Tertia, Septima, Undecima, Decima-quinta, Decima-nona, Vigefima-tertia, Vigefima-ſeptima, & Interlunium.

Signs of the Winds changing.

When the *Sun* rises with many pale Spots appearing in its Orb, and part of it hid in a Cloud, the *Wind*, (in what Point soever it be) will soon turn to the *South*.

When the *Wind* has been settled 24 Hours, or more, in any of the full Points (as *North*, *East*, *West*, or *South*) when it begins to turn, it will settle till it comes to the opposite Point, as from the *North* to the *South*, and so from full *East* to full *West*; and so of the angular Points, as from the *North-East*, to *South-East*.

Let the *Wind* be in what Quarter it will, upon the *New-Moon* it presently changes.

When the Generality of the Clouds rack, or drive with the *Wind* (tho' there are many in little Fleeces, or long Strakes, lying higher and appearing not to move) the *Wind* is flagging, and will quickly change and shift its Point.

Signs of Tempests arising.

MY Lord *Bacon* mentions these as Prognosticks; The Resounding of the Sea upon the Shoar, and the Murmur of Winds in the Woods, without apparent Wind, shew *Wind* to follow. For such Winds, breathing chiefly out of the Earth, are not at the first perceiv'd, except they be pent by Water or Wood. And therefore a Murmur out of the Caves likewise portends as much. So *Virgil*:

Continuo Ventis surgentibus aut freta Ponti

Incipiunt agitata tumescere, & aridus altis

Montibus

Signs of Tempests arising. 29

Montibus audiri fragor; aut resonantia longe
 Littora misceri, & Nemorum increbescere murmur.
 For e'er the rising Winds begin to roar,
 The working Seas advance to wash the Shoar:
 Soft whispers run along the leavy Woods,
 And Mountains whistle to the Murm'ring Floods.

Again,

Sæpe levem Paleam & Frondes volitare caducas
 Aut summâ nantis in Aquâ concludere Plumas.
 And Chaff with eddy Winds is whirl'd around,
 And dancing Leaves are lifted from the Ground,
 And floating Feathers on the Waters play.

Hence Pliny almost *Verbatim*,

*Equidem & Montium sonitus, Nemorumque mu-
 gitus prædicunt: Et sine Aurâ quæ sentiatur, Folia
 ludentia. Lanugo Populi (Ang. Poplar-Tree) aut
 Spinæ, volitans: Aquis Pluma innatans. Atque
 etiam in Campis Tempestatem venturam præcedens
 suam fragor.*

And thus Horace, Ode 17. Book 3^d.

Cras foliis Nemo

Multis, & algâ littus inutili

Demissa Tempestat ab Euro

Sternet, Aquæ nisi fallit Augur

Annosa Cornix —

To-morrow furious Winds shall spread
 The troubl'd Shoar with uselefs Weed,
 And fill the Woods with scatter'd Leaves,
 Unless the Cawing Crow deceives;
 The Crow that still foretells a Rain
 And Storm, and never Caws in vain.

Another Sign of arising Tempests, is when the
 Brightness of the smaller Stars are on a sudden ob-
 scur'd: For the upper Regions of the Air perceive
 the Collection of the Matter of Tempests and Winds
 before the Air here below. *Cæli quidem murmur
 non dubiam habet significationem,* says Pliny. And
 there.

30 Signs of Tempests arising.

therefore the Obscuring of the smaller Stars, is a Sign of Tempests following. *Vid.* Lord Bacon's Inquisitio de Ventis. Thus again *Pliny*, *Cum repente stellarum fulgor obscuratur, & id neque nubilo, neque caligine, Pluvia aut graves denunciantur Tempestates.*

The Air and Fire (says my Lord Bacon) have subtil Perceptions of the *Wind* arising, before Men find it. We see the trembling of a *Candle* will discover a *Wind*, that otherwise we do not feel; and the Flexious Burning of *Flames*, shows the Air is beginning to be unquiet; and so do *Coals* of *Fire*, by casting off the *Ashes* more than usual. The Reason is, because no *Wind* at first, till it has agitated the Air, is apparent to the Sense, but *Flame* is easier to move than Air. And for the *Ashes*, 'tis no wonder if *Wind* unperceiv'd shake them off, for we usually try which way the *Wind* blows, by casting up *Grass* or *Chaff*, or such light things into the Air— Thus far my Lord Bacon: which seems to be nothing else but a Translation out of *Virgil* and *Pliny*.

*Nec nocturna quidem carpentes pensa Puellæ
Nescivere Hiemem; testâ cum ardente viderent
Scintillare Oleum; & putris concreescere Fungos.*
The Nightly Virgin, while her *Wheel* she plies,
Foresees the Storm impending in the Skies,
When sparkling *Lamps* their sputtering *Light* ad-
And in the Sockets *Oily Bubbles* dance. [vance,
And *Pliny* more fully,

Terreni Ignes significant: Pallidi namque, murmurantesque, Tempestatum nuncii sentiuntur. Pluvia etiam in Lucernis Fungi. Si flexuose volitet Flamma, Ventum. Et Lumina cum ex se Flammas elidunt, aut vix dum accenduntur. Item cum in eo pendentes coacervantur Scintillæ: Vel cum tollentibus ollas Carbo adhærescit: aut cum contactus Ignis
è se

Signs of Tempests arising. 31

se favillam discutit, Scintillamque emittit: vel cum cinis in foco concrefcit, & cum Carbo vehementer perlucet.

The Reverend and Ingenious Mr. *Robinson* (in his *Nat. Hist. of Westmorland*, p. 7. &c.) gives us this Account of the Origin of *Wind*— That in the greatest Probability, it proceeds from vast Swarms of Nitrous Particles arising from the Bottom of the Sea, which being put into Motion, either by the Central Fire, or by that Heat and *Fermentation* which abound in this Great Body of the Earth: And therefore this first Commotion, excited by the said Fermentation, we call *A Bottom-Wind*, which is presently discover'd by *Porpices* and other Sea-Fish, which delight in Sport and Play upon the Waves of the Sea; who by their Playing, give the Mariners the first Notice of an approaching Storm. When these Nitrous Swarms are risen towards the Surface of the Sea, in a dark Night, they cause such a *Shining Light* upon the Waves, as if the Sea were on fire; and being deliver'd from the brackish Water, and receiv'd into the Open Air, those Fiery and Shining Meteors which fix upon the Masts and Sides of the Ships, and are only Nitrous Particles condensed by the circumambient Cold, and like that which the *Chymists* call *Phosphorus*, or Artificial Glow-worm, shine and cast a Light, but have no Heat: This gives to Mariners the 2^d Notice that the *Storm* is rising; for upon the first breaking out of the Wind, the Sea begins to be rough, the Waves swell and rise, when at the same time the Air is calm and clear.

This boiling *Fermentation* of the Sea causes the Vapours to arise, which by the Intenfeness of the circumambient Cold, is condensed into thick Clouds, and falls down in Storms of Wind and Rain,

32 *Signs of Tempests arising.*

Rain, first upon the Sea from whence they rose, and then the attractive Power of the Mountain-Cold, by a secret Magnetism, between Vapour and Cold, attracts the Waterish Vapours, intermixt with Nitrous Particles, to the high Tops of Mountains and Hills, where they hang hovering in thick Fogs and Waterish Mists, until the Atmospheric Heat rarifies the Nitrous Part of the Fog, which is always uppermost, and appears white and translucent, into brisk Gales of Wind, and the Intensity of Atmospheric Cold, having attracted the Vapours into the colder Regions of the Air, where, being condens'd into Clouds, the Wind breaks, dissipates, and drives them before it till they fall down in Rain, and water the Surface of the Earth; And this seems to be the Reason why, in *Egypt*, and those level Countries, where they have no Mountains, they have little Wind, and less Rain. Thus far this ingenious Author. And no doubt but the very same Observations may be made upon Eruptions from the Caverns of the Earth, as well as the Sea.

What seems to countenance this Author's Opinion, is a late Account of a *Phænomenon* in the Sea (mention'd in Mr. *Read's* Weekly Journal, N^o 1883) related by a Namesake (if not Relation) of this Author, as well as by Mr. *John Biss*, which is as follows— A Prodigy has lately happen'd about the Island of *Terseira* or *Tercera* (an Island of the Atlantick Ocean, between *Africa* and *North-America*, the Chief of the *Azores*) 17 Leagues distant S E. from it, in and about the 12th to the 20th of Nov. last 1720. by Fires which break out on the Surface of the Sea, with a most violent Impetuosity, throwing up Pumice-stones, and other Combustibles, and has form'd an *Island* of Three Leagues long, and as many broad, having considerable Height, and

Moun-

Signs of Tempests arising. 33

Mountainous, with Five *Vulcanoe's*, making a most hideous Noise like Thunder or great Guns, and a *Cloud* proceeding from it, breaking into small *Rain* of *Sand* instead of *Water*, and smelling like *Brimstone*—This astonishing Irruption caus'd a great *Earth-quake* in the said *Island*, which threw down a great many Houses in the City of *Angra*, and the adjacent Parts. And in *May* following it was still burning with Fire and Smoke and roaring Noise.

For a farther Account of the *Wlnds*, the Cause of 'em, and the Influence they have upon the Weather in most Parts of the World, I shall (for Brevity sake) refer the curious Reader to Mr. *Lowthorp's* Abridgment of the *Philos. Transf.* from p. 129. to p. 141. of Vol. II. And proceed to more common Observations and Signs of Wind, and sudden *Storms arising*, which are as follow,

If at *Sun-rising* pale Spots seem to appear in its Orb, and dazzle there, strong *Winds* will ensue from the *South*, the Wind soon shifting to that Point in whatever Quarter it was before.

If there appear fiery Spots, or those of a reddish Colour, in the *Sun* upon its Setting, much Wind will ensue speedily. And oftentimes a Red lowring Morning is the Fore-runner of *Wind*.

If the *Moon* blushes, and is Redder than usual, *Winds* are engendering, and *Storms* will arise.

Also a Reddish Circle about the *Moon* at the Full, denotes much *Wind*.

Meteors (or, as common People call 'em, *Stars shooting*) and spreading a long Train of Light, fore-run *Winds* that will soon ensue.

Thus *Virgil*,

*Sæpe etiam Stellas, Vento impendente, videbis
Præcipites Cælo labi, noctisque per umbram
Flammarum longos à tergo albescere tractus.*

34 *Signs of Tempests arising.*

And oft before tempestuous *Winds* arise
The *seeming Stars* fall headlong from the Skies,
And shooting thro' the Darknesh, gild the Night
With sweeping Glories, and long Trails of Light.

Hence *Pliny*,

*Discurrere Stellæ videntur interdum, Ventique
protinus sequuntur, in quorum Parte ita præsagivere.*

*Si volitare plures Stellæ videbuntur, quo feruntur
albescentes, Ventos ex iis Partibus nunciabunt.*

*Aut si cursitabunt, certos: Si id in pluribus Par-
tibus fiet, inconstantes Ventos effundent.*

Another Sign of great *Tempests* arising, is a mur-
muring Noise of Thunder from the North.

Also small scatter'd *Clouds* in the *South-West*,
that fly high, lie as it were in Ridges, and seem
not to move, engender *Winds*, often producing
Whirl-winds.

Pliny (*Nat. Hist.* l. 18. c. 79) says,

*Nubes cum sereno Cælo feruntur, à quâcunque
Parte id fiet, expectentur Venti: Si eodem loco globa-
buntur, appropinquante Sole discutientur. Et hoc si
ab Aquilone fiat, Ventos. Sole occidente si ex utrâ-
que Parte ejus Cælum petent, Tempestatem signifi-
cabunt.*

*Est & Aquarum significatio. Mare si tranquillum
in portu à cursu stabit, & murmuraverit intra se,
Ventum prædicit. Littora Ripæque si resonabunt
tranquillo, asperam Tempestatem: Item Maris ip-
sius tranquillo sonitus, spumæ-ve dispersæ, aut Aquæ
bullantes. Pulmones marini in Pelago, plurimum di-
cerum Hyemem portendunt. (These Pulmones marini
are accounted senseless Fishes, and yet give certain
Notice to the Mariners of approaching Storms.)
Sæpe & silentio intumescit Mare, flatuque altius so-
lito jam intra se esse Ventos fatetur.*

Signs

Signs of Tempests ceasing.

A Hasty Shower of Rain falling when the *Wind* has rag'd for some Hours, soon allays it.

If the Water ruckles much, and frequent Bubbles arise, the *Storm* is of a short continuance.

If the Bird call'd the *Halcyon*, or *King-Fisher*, attempts the Seas when the *Wind* blows hard, its a Sign of its abating.

The merry Chiripping of *Sparrows*, and *Moles* coming out of their Holes, are Signs of *Storms ceasing*.

Signs of Thunder and Lightning.

IT has been the Observation of those that have had many Years Experience of the Weather, That when the *Wind* in the Summer Time has been *South* 2 or 3 Days, and it grows very Hot, and when you see *Clouds* arise with great white Tops like Towers, as if one *Cloud* were on the Top of another, and join'd together with Black on the nether Side, that then it is like to be *Thunder* and Rain suddenly in many Places.

If there arise Two such *Clouds* with *Thunder* in them, the one on the one side of you, and the other on the other, then beware.

Another Sign of approaching *Thunder*, are *Meteors* shooting in the Night in Summer-time, for they denote the Air to be inflam'd with much Heat, and consequently that *Thunder* and *Lightning* will ensue.

36 Signs of Thunder, &c.

Likewise many *Chops* and *Clefts* in the Ground, show that abundance of Nitrous and Sulphureous Vapours have been exhal'd from the Earth, and got up amongst the Clouds; and there being impatient of Restraint, after long struggling and rumbling, at last burst through with a great Noise, which we call *Thunder*, and a sudden Flash, which we call *Lightning*, which are both instantaneous, tho' the one is seen before the other is heard, because the Sense of Seeing is quicker than that of Hearing.

If no *Clouds* appear in sultry Weather, and the *Sun* sets red and fiery, great *Flashes* will appear in the *North*, and *North-West*, which is call'd *Fulgetrum*, or *Lightning* without *Thunder*; because meeting with no *Opposition*, tho' springing from the same Cause, the Noise is not heard. *Pliny* (*Nat. Hist.* l. 18. c. 79.) says, *Cum Æstate vehementius tonuit quam fulsit, Ventos ex eâ parte denunciat: contra, si minus tonuit, Imbrem. Cum sereno Cælo Fulgetræ erunt & Tonitrua, adbiemabit. Atrocissimè autem, cum ex omnibus quatuor Partibus Cæli fulgurabit. Cum ab Aquilone tantum, in posterum diem Aquam portendit. Cum à Septentrione, Ventum eum. Cum ab Austro, vel Coro, aut Favonio, Nocte serenâ fulguraverit, Ventum & Imbrem ex iisdem Regionibus demonstrabit. Tonitrua matutina ventum significant, Imbrem meridiana.*

Virgil,

At Boreæ de parte trucid cum Fulminat, & cum Eurique Zephyrique tonat Domus; omnia plenis Rura natant fossis, atque omnis Navita Ponto Humida vela legunt —

But when the winged *Thunder* takes his way
From the cold *North*, and *East* and *West* engage,
And at their Frontiers meet with equal Rage,
The Clouds are crush'd, a glut of gather'd Rain
The hollow Ditches fills, and floats the Plain,
And Sailors furl their dropping Sheets amain.

Signs of Snow.

CLOUDS like Woolly Fleeces appearing high, and moving heavily; the Middle a Darkish Pale, and the Edges White, carry *Snow* in them, that in Winter frozen in Sheets by Cold *East*, *North-East*, or *North-West* Winds, pressing hard on the Atmosphere (no longer able to bear 'em up) shiver in the Fall and break into Flakes. If the *Clouds* be press'd nearer the Earth, the Vapours so frozen are grosser, and the Flakes larger; But more remote, thinner, and so fall in little Flakes.

The *Sun's* looking Pale at its Rising, the much Lowing of *Cattle* in the Field, the Croaking of *Ravens*, and *Birds* flagging their Wings, are all Signs of approaching *Snow*.

Signs of Hail.

IF the *Sun* at its Rising cast a glittering Light, as if it reflected on some Lucid Matter, tho' few or no Clouds appear at that time; the Vapours are condensed in the Cold Region, and fore-running into Clouds that will scatter violent *Hail*.

If (in the Morning) the *Eastern Skies*, before the *Sun*-rising, look Pale; and refracted Rays appear in thick Clouds, great Storms of *Hail* will ensue, to the great damage of Corn and Fruits.

Thus *Virgil*,

*Aut ubi sub lucem densâ inter Nubila sese
Diversi rumpent Radii, aut ubi pallidâ Surget*

Tithoni croceum linguens Aurora cubile;

Heu, malè tum mitis defendet Pampinus Uvas,

Tam

40 Signs of Cold and Frost.

Nubes globabuntur, Hyemem asperam denunciabunt.

Pliny's farther Remarks are these—

Sunt in signo Cancræ duæ Stellæ parvæ, Aselli appellatæ, exiguum inter illas spacium obtinente Nubeculâ quam Præsepia appellant: Hæc cum Cælo sereno apparere desierit, atrox Hyems sequitur. Si alteram earum Aquiloniam caligo abstulit, Auster sævit: Si Austrinam, Aquilo. Arcus cum sunt duplices, Pluvias nunciant: à Pluviis, Serenitatem non perinde certam. Circuli novi circa Sidera aliqua, Pluviam. Autumni serenitas ventosam Hyemem facit.

Signs of Frost breaking.

THE Sun's looking Waterish at its Rising, is one Sign that the Frost will break.

The Sun's setting in bluish Clouds, and casting refracted Rays into them, is another Sign.

The Stars looking Dull upon the Matter, and the Moon's Horns blunted, bid the Frost prepare to be gone.

The Wind having held long, and extreemly Sharp in one Point, and at last suddenly shifting, brings a Relaxation, if not a thorough Thaw.

Signs of Hard Winters.

LORD Bacon's Prognosticks of Hard Winters, are as follow:

The Predictions of Cold and Long Winters, and Hot and Dry Summers, are good to be known, as well for the Discovery of the Causes, as for divers Provisions. If Wainscot or Stone, that have been us'd to sweat (as they call it) be more Dry in the
Be-

Signs of Hard Winters. 41

Beginning of Winter, or the Drops of Eaves of Houses come down more slowly than they use, it portends a *Hard and Frosty Winter*. The Cause is, for that it shows an Inclination of the Air to Dry Weather, which in Winter is ever join'd with Frost.

Generally a *Moist and Cool Summer* portends a Hard Winter. The Cause is, for that the Vapours of the Earth are not dissipated in the Summer by the Sun; and so they rebound upon the Winter.

A *Hot and Dry Summer*, and especially if the Heat and Drought extend far into *September*, portends an open Beginning of Winter, and Cold to succeed toward the latter Part of the Winter, and the Beginning of the Spring. For till then the former Heat and Drought bear the Sway, and the Vapours are not sufficiently multiply'd.

An *Open and Warm Winter*, portends a Hot and Dry Summer: for the Vapours disperse into the Winter Showers; whereas Cold and Frost keep them in, and transport them into the late Spring and Summer following.

Birds that use to change Countries at certain Seasons, if they come Earlier, do show the Temperature of Weather, according to that Country whence they came: As the *Winter-Birds*, (namely, *Woodcocks*, *Feldefares*, and *Snipes*, &c.) if they come Earlier, and out of the Northern Countries, with us show Cold Winters. And if it be in the same Country, then they show a Temperature of Season, like unto that Season in which they come, as *Swallows*, *Nightingales*, *Cuckoes*, *Marlots* and *Batts*, that come towards Summer, if they come Early, show a Hot Summer to follow.

It is an Observation among Country-People, that those Years in which we have Store of *Haws* and *Heps*, do commonly portend Cold Winters; and they

42 *Signs of Hard Winters.*

they ascribe it to Providence, that reaches to the Preservation of Birds in such Seasons. The natural Cause also may be the want of Heat and Abundance of Moisture in the precedent Summer, which puts forth those Fruits, and must needs leave great Quantity of Cold Vapours not dissipated, which causes the Cold of the Winter following.

Signs of Pestilential Seasons.

IF the Year (says *Hippocrates*) prove to be for the most part Dry, acute Fevers must be expected. The Reason of which is plain, for by excessive Dry Weather, the Body is drain'd of its natural Moisture, so that nothing remains behind, but viscid and dry Humours, unfit for Circulation. The Tubuli of the Skin are parch'd up, and Perspiration hinder'd, whence proceed innumerable Distempers, Inflammations and acute Fevers.

If the Winter Season (says the same Author) be Dry and Cold, and the Spring Rainy, and subject to Southerly Winds, it must necessarily fall out that in Summer, acute Fevers, Rheums in the Eyes, and bloody Fluxes happen, especially to those who are of a Moist Constitution. The Reason of which is this, By great Dryness and Cold, the secretory Duets are contracted, and the Liquids grow viscid, because Perspiration is hereby hinder'd. For too great Cold hinders Perspiration, and contracts the Fibres as much as too great Heat. Which Viscidity, being dissolv'd and fermented by the supervening Moist Season, is dispos'd to Putrefaction.

But if the Winter be Southerly, Hot, and Rainy, and the Spring Northerly and Dry, then it is often an Occasion of Abortions in Women, or else the

Pro-

Signs of Pestilential Seasons. 43

Production of weak and diseas'd Children. To others an Occasion of Bloody Fluxes, and Inflammation of Eyes; and to Old People, Rheums and Catarrhs, which shortly kill 'em. ' For by such an unseasonable Warmth and Rain, the Bodies, especially of Women, are render'd lax, heavy, and infirm. And this is the Reason why such a Season is so pernicious both to very Young and Old People. But Middle-aged People may overcome it, by the Help of their strong Constitution to digest such viscid and putrid Humours, as are occasion'd by such a heavy Air.

If the Summer be Dry and the Wind Northerly, but the Autumn Rainy and the Wind Southerly, then violent Pains in the Head, Coughs, Hoarsenesses, and Rheums, and to some Consumptions, are to be expected in the Winter following. For by the Cold of the Summer and Heat of Autumn, Human Bodies grow Costive, Perspiration is obstructed, and in time the Upper Parts of the Body, especially the Head, are over-charg'd with viscid Humours, which are the Causes of such Distempers of the Head and Lungs.

My Lord *Bacon* says, it has been observ'd, that those Years are Pestilential and Unwholsome, when there are great Numbers of *Frogs*, *Flies*, and *Locusts*, &c. The Cause is plain, for that those Creatures being ingender'd of Putrefaction, when they abound, show a great Disposition of the Year, and Constitution of the Air, to Diseases of Putrefaction. The Wind blowing much from South without Rain, and Worms in Oak-Apples, as well as Plenty of *Frogs* and *Flies*, show the like. It was observ'd in the Great *Plague* in 1676, that there was seen in divers Ditches and Low Grounds about *London*, many *Toads* that had Tails 2 or 3 Inches long at least, whereas *Toads* usually have no Tails at all;

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which argues a great Disposition to Putrefaction in the Soil and Air. It is reported likewise that *Roots* (such as *Carrots* and *Parsnips*) are more Sweet and Luscious in Infectious Years than others.

Great and *Early Heats* in the Spring (particularly in *May*) without Winds, portend *Pestilential* Seasons.

A *Dry March* and a *Dry May*, portend a wholesome Summer, if there be a *Showry April* between; But otherwise it is a Sign of a *Pestilential Year*. And generally Years with little Wind or Thunder portend the same.

Great *Droughts* in Summer, lasting till toward the End of *August*, and some gentle Showers upon them, and then some Dry Weather again, do portend a *Pestilential* Summer the Year following: For about the End of *August*, all the Sweetness of the Earth which goes into Plants or Trees is exhal'd (and much more if the *August* be dry) so that nothing then can break forth of the Earth but a gross Vapour, which is apt to corrupt the Air; and that Vapour by the first Showers, if they be gentle, is released, and comes forth abundantly. Therefore they that come Abroad soon after those Showers, are commonly taken with Sickness. And in *Africa* no-body will stir out of doors after the first Showers. But if the Showers come vehemently, then they rather wash and fill the Earth, than give it leave to breath forth Presently. But if Dry Weather come again, then it fixes and continues the Corruption of the Air upon the First Showers begun, and makes it of ill Influence even to the next Summer, except a very Frosty Weather discharge it, which seldom succeeds such Droughts.

The Lesser Infections of the *Small-Pox*, *Purple Fevers*, and *Agues* in the Summer precedent, and hovering all Winter, do portend a great *Pestilence*

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in the Summer following: For Putrefaction does not rise to its height at once.

It were a good way to lay a Piece of raw Flesh or Fish in the open Air for Trial, and if it putrefy quickly, it is a Sign of a Disposition in the Air to Putrefaction. And because you cannot be inform'd, Whether the Putrefaction be quick or late, except you compare this Experiment with the like Experiment in another Year; it were not amiss in the same Year, and at the same Time, to lay one Piece of Flesh or Fish in the open Air, and another of the same kind and bigness within Doors: For I judge that if a general Disposition be in the Air to putrefy, the Flesh or Fish will sooner putrefy Abroad where the Air is stronger and has more Power, than the House where it is weaker and has less, being many ways corrected. And this Experiment wou'd be made about the End of *March*; for that Season is likest to discover what the Winter has done, and what the Summer following will do upon the Air. And because the Air no doubt receives great Tincture and Infusion from the Earth, it were good to try that Exposing of Flesh or Fish both upon a Stake of Wood some height above the Earth, and upon the Flat or Superficies of the Earth.

It has been noted by the Ancients, That *Southern Winds* blowing much without Rain, do cause a Feverish Disposition of the Air; but with Rain, not. The Cause is, for that *Southern Winds* do of themselves qualify the Air to be apt to cause Fevers; But when Showers are join'd, they do refrigerate in part, and check the sultry Heat of the *Southern Wind*. Therefore this holds not in the Sea-Coasts, because the Vapours of the Sea without Showers, do refresh.

The Cause assign'd to Malignant Epidemical
Diseases,

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Diseases, particularly the *Plague*, by the Ingenious and Learned Dr. *Mead*, is an Hot and Moist Temperament of the Air, which is observ'd by *Hippocrates*, *Galen*, and the General Histories of Epidemical Diseases, to attend those Distempers. Vid. *Mead* of *Poisons*, Essay 5. p. 161. But indeed (says the Reverend and Ingenious Mr. *Derham*, in his *Physico-Theology*) whether the Cause be this, or Poisonous, malignant Exhalations, as others think, the *Winds* are however very Salutiferous in such Cases, in cooling the Air, and dispersing and driving-away the Moist or Pestiferous Vapours. It is well observ'd (in my Lord *Howard's* Voyage to *Constantinople*) That at *Vienna* they have frequent *Winds*, which if they cease long in Summer, the *Plague* often ensues: So that it is now grown into a Proverb, *That if Austria be not Windy, it is subject to Contagion.* *Bobun* of *Wind*. p. 213.

From some such Commotions of the Air (says Mr. *Derham*) I imagine it is, that at *Grand-Cairo* the *Plague* immediately ceases as soon as the *Nile* begins to over-flow; altho' Mr. *Boyle* attributes it to Nitrous Corpuscles. *Determ. Nat. Effluv.* Cap. 4.

Nulla enim propemodum Regio est, quæ non habeat aliquem Flatum ex se nascentem, & circa se cadentem.

Signs of Continuance of Weather.

SOME that have been very curious Observers of the Weather, have laid down this as a pretty good Rule to be ensur'd of the Weather for four or five Days together (if a Man was to go a Journey or so) and not fail one time in ten, When the Wind has been in the North, or North-East, two Days without

without Rain, and continue in the same Point the third Day, then one may venture to go a Journey, if the Air be clear. Because one may wait a Month or Two for a Week of Fair Weather together, and not have it. Therefore this Rule is of use every Week for a single Day or Two.

Prognostications of the Weather by the Weather-Glasses.

THE principal Observations made upon the *Barometer*, by the learned Dr. *Halley* (*Philos. Trans.* N°. 181.) from the different Heights of the *Mercury* at several times, are these,

The First is, That in Calm Weather, when the Air is inclin'd to Rain, the *Mercury* is commonly Low.

2. That in serene good settled Weather, the *Mercury* is generally High.

3. That upon very great Winds, tho' they be not accompanied with Rain, the *Mercury* sinks lowest of all, with relation to the Point of the Compass the Wind blows upon.

4. That, *ceteris paribus*, the greatest Heights of the *Mercury* are found upon *Easterly*, and *North-Easterly* Winds.

5. That in calm Frosty Weather the *Mercury* generally stands High.

6. That after very great Storms of Wind, when the *Quick-silver* has been Low, it generally rises again very fast.

7. That the more *Northerly* Places have greater Alterations of the *Baroscope* than the more *Southerly*.

8. That within the Tropicks, and near them, whose Accounts we have had from others, and my own

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own Observations at *St. Helena*, make very little or no Variation of the Height of the *Mercury* at all Weathers.

Hence I conceive that the Principal Cause of the Rise and Fall of the *Mercury*, is from the variable Winds which are found in the *Temperate Zones*, and whose great Unconstancy here in *England* is most notorious.

A Second Cause is the uncertain Exhalation and Precipitation of the Vapours lodging in the Air, whereby it comes to be at one time much more crowded than at another, and consequently Heavier; but this latter in a great Measure depends upon the former. Now from these Principles I shall endeavour to explicate the several Phenomena of the *Barometer*, taking them in the same order I laid them down: Thus

1. The *Mercury's* being Low enclines it to Rain, because the Air being Light, the Vapours are no longer supported thereby, being become Specifically Heavier than the Medium wherein they floated; so that they descend towards the Earth, and in their fall, meeting with other Aqueous Particles, they incorporate together, and form little Drops of Rain; but the *Mercury's* being at one time lower than at another, is the Effect of two Contrary Winds blowing from the Place where the *Barometer* stands; whereby the Air of that Place is carried both Ways from it, and consequently the incumbent Cylinder of Air is diminish'd, and accordingly the *Mercury* sinks; as for instance, If in the *German Ocean* it shou'd blow a Gale of *Westerly* Wind, and at the same time an *Easterly* Wind in the *Irish Sea*; or if in *France* it shou'd blow a *Northerly* Wind, and in *Scotland* a *Southerly*; it must be granted me that that Part of the Atmosphere impendent over *England*, wou'd thereby be exhausted and attenuated,

ated, and the *Mercury* wou'd subside, and the Vapours which before floated in those Parts of the Air of equal Gravity with themselves, wou'd sink to the Earth.

2. The greater Height of the *Barometer* is occasion'd by two contrary Winds blowing towards the Place of Observation, whereby the Air of other Places is brought thither and accumulated; so that the incumbent Cylinder of Air being increas'd both in Height and Weight, the *Mercury* press'd thereby must needs Rise and stand High, as long as the Winds continue so to blow, and then the Air being specifically Heavier, the Vapours are better kept suspended, so that they have no Inclination to precipitate, and fall down in Drops, which is the Reason of the serene Good Weather, which attends the greater Heights of the *Mercury*.

3. The *Mercury* sinks the lowest of all by the very rapid Motion of the Air in Storms of Winds. For the Tract or Region of the Earth's Surface, wherein these Winds rage, not extending all round the Globe, that Stagnant Air which is left behind, as likewise that on the Sides, cannot come in so fast as to supply the Evacuation made by so swift a Current, so that the Air must necessarily be attenuated, when and where the said Winds continue to blow, and that more or less according to their Violence; add to which, that the Horizontal Motion of the Air, being so quick as it is, may in all Probability, take off some part of the perpendicular Pressure thereof: And the great Agitation of its Particles, is the Reason why the Vapours are dissipated, and do not condense into Drops so as to form Rain, otherwise the natural Consequence of the Air's Rarefaction.

4. The *Mercury* stands the Highest upon an Easterly or North-Easterly Wind, because in the

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Great *Atlantick* Ocean, on this Side the 35th Deg. of *North* Latitude, the *Westerly* and *South-Westerly* Winds blow almost always Trade, so that whenever Here the Wind comes up at *East* and *North-East*, 'tis sure to be check'd by a contrary Gale, as soon as it reaches the *Ocean*; wherefore, according to what is made out in our Second Remark, the Air must needs be heap'd over this *Island*, and consequently the *Mercury* must stand High, as often as these Winds blow. This holds true in *This Country*, but is not a general Rule for others, where the Winds are under different Circumstances: And I have sometimes seen the *Mercury* Here as Low as 29 Inches upon an *Easterly* Wind, but then it blew exceeding hard, and so comes to be accounted for, by what was observ'd upon the Third Remark.

5. In Calm Frosty Weather the *Mercury* generally stands High, because (as I conceive) it seldom freezes, but when the Winds come out of the *Northern* and *North-Eastern* Quarters, or at least unless those Winds blow at no great Distance off: For the *Northern* Parts of *Germany*, *Denmark*, *Sweden*, *Norway*, and all that Tract from whence *North-Eastern* Winds come, are subject to almost continual Frost all the Winter; and thereby the lower Air is very much Condensed, and in that State is brought *Hitherwards* by those Winds, and being accumulated by the opposition of the *Westerly* Wind blowing in the *Ocean*, the *Mercury* must needs be press'd to a more than ordinary Height; and as a concurring Cause, the shrinking of the lower parts of the Air into lesser room by Cold, must needs cause a descent of the Upper parts of the Atmosphere to reduce the Cavity made by this Contraction to an *Æquilibrium*.

6. After great Storms of Wind, when the *Mer-*
cury

cury has been very Low, it generally Rises again very fast; I once observ'd it to rise an Inch and a Half in less than Six Hours after a long continu'd Storm of *South-West* Wind. The Reason is, because the Air being very much rarified, by the great Evacuations which such continu'd Storms make thereof, the neighbouring Air runs in the more swiftly to bring it to an *Æquilibrium*, as we see Water runs the faster for having a great Declivity.

7. The Variations are greater in the more *Northerly* Places, as at *Stockholm* greater than at *Paris* (compar'd by *M. Pascall*) because the more *Northerly* Parts have usually greater Storms of Wind than the more *Southerly*, whereby the *Mercury* shoud sink Lower in that Extream; and then the *Northerly* Winds bringing the condens'd and ponderous Air from the Neighbourhood of the *Pole*, and that again being check'd by a *Southerly* Wind, at no great distance, and so heap'd, must of Necessity make the *Mercury*, in such case, stand Higher in the other Extream.

8. Lastly, This Remark, That there is little or no Variation near the *Æquinoctial*, does above all others, confirm the Hypothesis of the Variable Winds being the Cause of these Variations of the Height of the *Mercury*, for in Places above-nam'd there is always an easy Gale of Wind, blowing nearly upon the same Point, viz. E. N. E. at *Barbadoes*, and E. S. E. at *St. Helena*, so that there being no contrary Currents of the Air to exhaust or accumulate it, the Atmosphere continues much in the same State: However upon Hurricanes (the most violent of Storms) the *Mercury* has been observ'd very Low, but this but once in Two or Three Years, and it soon recovers its settled State of about 29 Inches and a Half.

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Dr. *Wallis's* Observations on the *Barometer* are these — In thick foggy Weather I find my Quick-silver to rise ; which I ascribe to the Heaviness of the Vapours in the Air.

In Sun-shiny Weather it rises also (and commonly the clearer, the more) which I think may be imputed partly to the Vapours rais'd by the Sun, and making the Air heavier ; and partly to the Heat, increasing the Elastic or Springy Power of the Air : which latter I rather add, because I have sometimes observ'd in Sun-shiny Weather when there have come Clouds for some considerable time (suppose an Hour or Two) the *Quick-silver* has fallen ; and then upon the Sun's breaking out again, it has risen as before.

In Rainy Weather, it uses to fall (of which the Reason is obvious, because the Air is lighten'd, by so much as falls :) In Snowy Weather likewise, but not so much as in Rain. And sometimes I have observ'd it, upon a Hoar-Frost falling in the Night.

In Windy Weather, I find it generally to fall ; and that more universally, and more discernably, than upon Rain (which I attribute to the Wind's moving the Air collaterally, and thereby not suffering it to press so much directly downwards ; the like of which we see in Swimming &c.) and I have never found it Lower than in High Winds.

I have divers Times, upon discerning my *Quick-silver* to fall without any visible Cause at Home, look'd abroad, and found (by the Appearance of broken Clouds, or otherwise) that it had rain'd not far off, tho' not with us : whereupon the Air being then lighten'd, our heavier Air (where it rain'd not) may have in part discharg'd it self on that lighter.

Dr. *Lister's* Observations on the *Barometer* are these — In *England* in a violent Storm, or when the

the *Quick-silver* is at the very Lowest, it then visibly breaks and emits small Particles (as I have more than once observ'd) which Disorder I look upon as a kind of fretting; and consequently at all times of its Descent, it is more or less upon the Fret. In this Disorder of the *Quick-silver*, I imagine it has its Parts contracted; because then the *Quick-silver* emits fresh Particles of Air into the Tube, which increasing the Bulk of the Air, and consequently its Elasticity, the *Quick-silver* is necessarily deprefs'd thereby. And that much Air is mix'd with it, appears from the Application of a heated Iron to the Tube, as is practis'd in the purging of it that Way.

Now when the *Quick silver* rises in the Tube (which it certainly does both in Hot and Frosty Weather) it may then be said to be in a Natural State, free, open, and expanded like it self, which it seems it ever is within the *Tropicks*, and with Us only in very Hot, and very Frosty Weather. But when it descends, it is then contracted, and as it were convuls'd and drawn-together, as it mostly is in our *Climate* of *England*, and more or less (as we guess) in all Places on this Side the *Tropicks*. Which Contraction plainly appears from the Concave Figure of both Superficies, not only in that of the *Quick-silver* in the Tube, but also (if well observ'd) in that which stagnates in the Pot or Dish it self.

The Difficulty seems to ly in the reconciling the same Effect of the *Quick-silver's* Rising in the Tube, from such seemingly-different Causes, as great Heat and intense Frost: And those who shall willingly assent to us in one Particular, and grant us Warmth as a probable Cause of its Restitution to its Nature, will yet be at a stand how to imagine, that Great Frost like wise shou'd bring the *Quick-silver* nearer

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to its Own Nature too. I answer that *Salts* liquify'd, will coagulate or crystalize, *i. e.* will return to their own proper Natures, both in Cold and in Heat: and therefore tho' most Men practise the setting them in a Cool Cellar for that purpose, yet some (as *Zwelfer*) advise, as the best means to have them speedily and fairly Crystalliz'd, to keep them constantly in *Balneo*. Thus also the *Lympha* of the *Blood* does become a Jelly, if you set it in a Cool Place, and the same is by Warmth in like manner inspissated.

It will not be amiss to add by way of Corollary a Note concerning Healthful and Sickly Seasons, more particularly as it may refer to this *Phenomenon* of Great Cold and Frost. If therefore *Quick silver* and Liquids are nearest their own Natures, and have less Violence done to them, in very Cold and very Hot Seasons; the *Humours* of our Bodies, as Liquids, in all Probability must be in some Measure accordingly affected. And that therefore Cold is healthful, I argue from the vast Number of Old Men and Women to be found upon the Mountains of *England*, comparatively to what are found elsewhere.

Again, the *Blood* itself (or the vital Liquor of Animals equivalent to it) is in most Kinds of Animals in Nature, or its Natural State, sensibly Cold; for that the Species of *Quadrupeds* and *Fowls*, are not to be compar'd, for Number, to *Fishes* and *Insects*; there being in all Probability (by what I have observ'd) above 100 Species of these latter Creatures, whose vital Juice is Cold, to one of the former: But because we most converse with those whose vital Juice is Hot, we are apt to think the same of all.

Mr. *Boyle* has left us these general Observations and Directions concerning the *Barometer*.

I. It

1. It will be requisite to note the Day and Hour in which Observations are made.

2. The Situation of the Place where the *Barometer* stands as to Height, since by the Length of the Atmospherical Pillar of Air, that presses upon it, the Height of the *Mercury* may vary; tho' not always exactly; For sometimes upon Changes in the Air not otherwise observable, the *Mercury* will subside more than usually in that which stands farthest from the Center of the Earth, when at the same time it does not proportionably subside in that which is plac'd in a lower Station. And

It, perhaps, may be worth noting, whether upon excessive Droughts, when the Ground is parch'd and crack'd, some subterranean Effluvia may not rise, which may add a specifick Gravity to the Air.

Nor will it be needless, when other Observations are making, at the same time to observe the Weather; as also what Winds blow, and whether violent or more remis? For sometimes it is observ'd, that when High Winds blow, the *Mercury* is the the Lower, tho' not always.

But to favour what has been intimated, viz. That the Alterations in the Weight of the Air depend on subterranean Steams mix'd with it; It has been observ'd that after long Droughts, upon a Shower of Rain, so many Steams have been either prevented from rising, or depress'd and precipitated, that the *Mercury* has subsided within Two Sixteen Parts of an Inch.

As the *Thermometer* measures the Degrees of Cold and Heat, and the *Barometer*, those of the Weight of the Air, so we may make use of a Machine call'd *Hygrometer*, or *Hygroscope* to measure the Dryness or Humidity of the Air; for certain it is, that the Air is more or less Moist, as 'tis more or less stock'd with Vapours.

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One sort of *Hygrometer* may be made of a String of Cat-gut, Four Foot Nine Inches long, made fast at its two Extremities, against any Wall or Wain-foot, loaded in the Middle with a Lead Weight of Half a Pound, tied to the String, which will lower it more or less according to the Degrees of the Dryness or Moisture of the Air mark'd upon a perpendicular Plain divided into equal Parts, like the Table belonging to a *Barometer*: For when the String has been steep'd in Brine, the Moistness of the Air will contract it, and so raise the Weight, and on the contrary, the Dryness of the Air will dilate it, and consequently the Weight will sink. You may also contrive an Index to be plac'd against the Degrees of Variation, to slide Higher or Lower, and by it discover how much the Weather varies every day, or is at a Stand. Instead of a Cat-string you may have a Piece of Packthread or Whipcord, which indeed seems to be more susceptible of Moisture; for Moisture easily insinuates into all Porous Bodies, and above all, into Strings which shorten sensibly upon the Accession of the least Moisture. Thus when *Sixtus V.* set up the Obelisk of the *Vatican* in *Rome*, the Cables being made longer by that huge Weight, which (*M. Ozanam* tells us) weigh'd One Million Six Thousand Forty Eight Pounds, he order'd the Cables to be soak'd in Water, upon which they shrunk so, that they set that huge Mass upon its Basis, as it now stands.

Another Way of making a good *Hygroscope* is, by putting a certain quantity of Salt-petre well calcin'd, into one Scale of a just Ballance, and an equal Weight of Lead-drops into the other, so as to make the Scales hang exactly in *Æquilibrio*; then add to the Centre of the Motion of the Ballance, a small Circle divided into equal Parts, representing the Degrees of the Dryness or Moisture of the Air,

Weather-Glaffes.

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Air, which the Tongue of the Ballance will point to, as the Air grows Moister or Dryer, for the moister the Air grows, the more will the Lead rise.


But the Invention of *Hygrosopes* is endless: I shall therefore only add this Observation: Mr. *Foucher* says he has experienc'd, by means of an *Hygrometer*, That in Summer the Weather is moistest between Eight and Nine in the Morning; And that the Air is moister (or fuller of Vapours) at Full Moon, than-when the Moon is near the Change.

H

AP.

APPENDIX.

An Account of an *AURORA BOREALIS*, or Strange Appearance in the Air, *March 6th 1715--16.* Together with the Causes and Prognostications of it.

 *ARCH 6th 1715--16.* in the Evening, was observ'd in the Firmament, in most Parts of *Europe*, a very surprising Phenomenon, call'd by the Naturalists, *AURORA BOREALIS*, which tho' not so rare in more *Northern* Climes, is very seldom seen in our *Southern* Parts, and is generally of less Duration where more frequent. In the *North-West* was observ'd a small Cloud (if it might be so call'd) or rather a Gathering in the Sky, having something Particular in its Colour. After some little time it began to labour and curl, and make many extraordinary Motions and involving Turns within it self. In 5 or 6 Minutes after it had work'd in this manner within it self, folding (as it were) and unfolding, it separated it self into long and broad Streams of Light, *Coruscation*, or *Fulgor*, issuing out of the aforesaid darkish Cloud or Fund of Vapours (about 25 or 30 Degrees above the *Horizon*, *North-East* as near as could be guess'd) resembling the Beams of the *Sun* Setting

Setting in a drizzling Evening, the Streams pointing directly towards the *Zenith*. It was the more astonishing, considering the *Sun* had been more than an Hour set, and the *Moon's* rising not being till Morning. Presently after, some other Streams or Pyramids of Light issued out of the same Cloud, near to the former, with a very unusual Light, and with variety of Colours, Black, Blue, Flame-colour, Yellow, &c. and so more and more, till all that Part of the Heavens was over-spread. These *Bright Beams* seem'd to make their way, one after another, regularly enough into the *West*. When they were all posted in the *West*, of a sudden, after one another, they shot almost directly *Eastwards* (and avoided the *South* entirely) and this they did with the utmost Precipitation and Celerity. In the *East* they appear'd Higher-colour'd than they did in the *West*; but retain'd still for a little time the resemblance rather of *Columns of Light* than of Fire-Beams. At last they began to wheel about, and intermingle their Points, and made such violent and quick Vibrations among one another, that it was not possible to find out the Order of their Motions. This Hurly-burly of Confusion was about 7 a Clock in the Evening, and lasted about an Hour and Half; from the Violence whereof on a sudden burst out a very great *party-colour'd Flame*, which seem'd to be double and folding in upon it self with great Vehemence and Fury. Thro' all that disturb'd Region of the Air, the *Stars* appear'd clear, as thro' a thin bright Smoak, or as the *Sun* sometimes thro' a thin bright Cloud. The other Part of the Heaven toward the *North-East* and *South-East*, was very clear, the Stars bright and twinkling as in a Winter's Cold Night when there is no *Moon*. About 9 a-Clock at Night these *Meteors* in a great measure disappear'd, but not quite:

Some faint sort of Contentions were still perceiv'd from the *East* to the *North*: and about 10 a-Clock they broke out again with a fresh Violence, and darted to the *West* in the same manner as before, and thence to the *East*, and so continu'd till about Half an Hour past 11, and then they retir'd from the *East* to the *North* again: About 12 a bright *Globular Body* appear'd, as big as, and like the *Sun* at his Rising, but not quite so clear. During this time, the Light was such that one might plainly see to Read. The Night was Calm, not so much as a Breath of Wind was perceiv'd. About 3 the next Morning, the *Coruscations* by degrees ceased, and the Great Light in the *North-East* exactly resembled the *Dawn of Day*, and therefore call'd *AURORA BOREALIS*.

For then small Sparks appear'd, and scatter'd Lights Broke swiftly forth, and wak'd the sleepy Night: The Night amaz'd began to hast away,
As if those Fires were *Beams of coming Day*.

Creecb's Lucretian

Now the natural Cause of this *Phænomenon* I take to be a vast Quantity of *Nitrous Particles* exhal'd from the *melted Snow* (an unusual Quantity of which we had in the Winter time) together with an Exhalation of a great Quantity of *Sulphureous Particles*, which been long lock'd up in the Pores of the Earth, and upon the Melting of the *Snow* rais'd up into the Middle Region of the Air, from whence they came, (otherwise this *Phænomenon* cou'd not have been so Universally seen, as it was, in all Parts). These *Nitrous* and *Sulphureous Particles* being exhal'd in thin Vapours by the Heat of the Sun, and other Stars into the Middle Region, were by Degrees condens'd by circumambient Clouds together with the Coldness of that Region, till at last they became a strong compacted Body, *Vita*

unita

unita fortior. This restless and rebellious Spirit of *Nitre & Sulphur* in Conjunction, growing stronger and stronger, and altogether impatient of Restraint, was for a long time struggling for Liberty; till at length, partly by the kind Influence of the rarifying *Sun*, removing the Frontiers, and so making-way for the pressing ambient Clouds to fall-back; and partly by its own proper Force and Motion, fir'd with Zeal and Resolution, it burst thro' all Obstacles (the finer Part of it taking Fire first) displaying it self in flying Colours, in Thundring Streams of Light, and here and there astonishing Coruscations; to no small Amazement of the Lower World, many of whose ignorant Inhabitants stood beholding the Wondrous, because Un-usual Sight.

These *Bruta Fulmina*, this harmless Thunder and Lightning in the middle Region of the Air, bears some Resemblance with the common Thunder and Lightning in our gross Atmosphere: And no doubt but this unusual Lightning was attended with some *Noise*, tho' little, and not heard at this Distance, because out of the Verge of our Sphere, and beyond the Convexity of our Atmosphere. And no doubt but the Matter of both these Sorts of *Thunder* and *Lightning*, both in the Lower and Middle Region of the Air (as the old *Philosophers* call 'em) were the same, and even the Manner of their Generation the same, only those in the upper Region were certainly generated of greater Quantity of Exhalations, and charg'd with greater Quantity of *Nitre* and *Sulphur*, and consequently were rais'd the Higher. They differ only as to the Manner of *Lightning* and Illumination. Those *Lightnings* that happen in the lower Region, are struck and darted upon the Earth all at once, I mean every single Flash at one Stroke, and so all its Matter is scatter'd and dispers'd, and hinder'd from rallying again;

again: But the *Lightnings* in the Upper Region being not darted against any hard Body, are several times recollected. These have a larger, finer, and more unconfin'd Space of Air for Expansion and Explofion. These are shot, with the utmost Celery, a great many Miles at one Flash, (according to the Strength and Quantity of the *Aerial Gunpowder* they are charg'd with) and then the remaining Matter is detain'd, embarrass'd and involv'd within some distant and condensing Cloud for some time, as the whole Matter was at first, till at length they rally and burst out again in the same Manner as before, and perform another Stage, and after that another, and perhaps another, till their Force being almost spent in such long Journeys, their Vibrations grow fainter and fainter, and consequently shorter and shorter, they at last terminate in a general Illumination of rarify'd Air, like the Dawn of Day, and so call'd *AURORA BOREALIS*, as I said before.

The Reason of all the *Flashes* of *Lightning* darting in the same Tract, is the rarify'd Air caus'd by the first Flash. For a small Quantity of Forerunning Particles breaking Prison first, and setting out beforehand, prepar'd the Way for the rest by clearing the Air, and so caus'd those faint Coruscations which preceded those more terrible and astonishing Flashes of *Lightning*.

If it shou'd be objected against this Opinion of mine, that *Nitre* is a Cold Body, and therefore cou'd not be any Constituent Part of this Hot and *Fiery Meteor* I speak of. Suppose the Supposition just, yet *Nitre* and *Sulphur* mixt together, must be allow'd to be Inflammable; and if the Objector had but courage enough to place himself at the Mouth of a fir'd Cannon charg'd with such Ingredients, he might quickly be convinc'd by Experiment. But
not

not to put him to so much Danger, 'twill be safer for him to apply himself to that Learned Naturalist Mr. Boyle for Conviction, who in his *Experimental History of Cold*, Tit. 17. Sect. 8. confutes *Gassendus*, who ascribes the Frigorifick Virtue of Bodies to the admixture of Nitre. Tho' I allow *Nitre* (says he) to be a Substance dispers'd thro' most Bodies, yet, since Cold is only a Privative Quality, and an Absence of Heat, there are other Agents, which by stopping the Motion of the insensible Parts of a Body, may deprive it of its Property of Heating. And tho' *Gassendus* asserts, that Bodies receive the Impressions of Cold, from *Nitrous* Exhalations swimming in the Air; yet amongst all the Experiments I have made to resolve *Nitre* into Vapours, I have not found, that it was able to effect more in the Production of Cold, than any other Saline Bodies. And Spirit of *Nitre* is so far from having an actual Coldness greater than other Bodies, that it is potentially Hot. And whether the Exhalations of *Nitre*, will congeal Water or not; Spirit of *Nitre*, I have observ'd, will dissolve Ice, as soon almost as Spirit of Wine: And tho' *Nitre*, mixt with Snow or Ice may promote Congelation; yet it proves not that the Parts of *Nitre* are frigorifick; since the Experiment will succeed with Spirit of Wine—— Thus far this excellent Naturalist.

Let us now compare what has been said upon our Phenomenon, which appear'd lately, with a like Phenomenon that appear'd about 100 Years ago, and is describ'd by the afore-mention'd Learned *Gassendus*, in his Chapter *De Aurora Boreali, & Ignibus noctu per Aerem discurrere visis*. Tom. 2^a. Physicæ, pag. 107. &c.

Circa Fulgorem mirabilem, qui aliquando Nocte intempestivâ & silente Lunâ, totum Septentrionalem Tractum ita occupat, ut claram Auroram mentiatur,
unde

undè & Aurora Borealis ab aliquibus dicitur. 'Quædam Phænominorum (inquît Seneca) tantum Lucis emittunt, ut fugent Tenebras, & Diem representent, donec consumpto Alimento, primum obscuriora sint, deindè Flammæ modo, quæ in se cadit, per assiduam diminutionem redigantur in nihilum. Tale Phænomenon apparuit Anno 1621. Sept. 12.

Sunt 4. modi horum Phænomenorum generandum, qui ab Epicuro recensentur. Unus non prorsus improbabilis esse videtur, ut habens quidpiam simile cum Fulminum generatione. Scilicet ejusdem generis Materies sic accendere Sursùm debet, ut non grandi quidem & Condensâ Nube, sed tenui tamen nec serenitatem Conturbante Nebulâ (nempe tales aliquæ sunt ex quibus sæpè vidimus concreescere spontè in sereno Nubes) ut, inquam, tenui Nebulâ quasi amictu quodam contineri debeat, quousque Sublimè eveicta, intra eam volvatur, incalascit, ex quâ parte tenuior, amicusque fragilior fuerit, accendatur, erumpat, ac interim Ignis reliquam materiam, ob sui lentorem, seu tenacitatem non statim depastam, in residuam partem amiculi urgeat, avolantemque, ut continens sui pabulum insectaretur, quousque eâ plani consumptâ, ipse extabescat, & visibilis fieri desinat—

Pag. 108. Albor ille, sive Auroræ--speciem--emulata Claritas, apparuit mihi ad Boream; sic ad Boream quoque apparuerit quibuscunque conspicua fuit, nemini verò prorsus ad Austrum. Stuporem adauget, vel ex eo quòd cum Materies Phænomeni fuisse pertenuis Vapor videretur, oportuerit talem Vaporem esse aut immensæ Diffusionis secundum Terræ Superficiem, aut immensæ Altitudinis, ut nihil Superficie Terræ Devertitas obstiterit, quò minùs è Locis adeo diffitis eodem in situ conspiceretur: ac tantò magis, si ulterius & in extremum usque Septentrionalem fuit Phænomenon propagatum.

It may not perhaps be altogether improper in this place, to add to this (by way of farther Explanation of these Matters) the Accounts that are given of *Igneous Meteors* by the Learned Mr. Morton, Dr. Woodward, Dr. Wallis, and Dr. Plot.

Igneous Meteors (says Mr. Morton in his *Nat. Hist. of Northamp.* p. 343.) are form'd of Mineral Exhalations, as Thunder and Lightning. The Cause whereof is especially Nitre and Sulphur, raised out of the Earth by a considerable Degree of Heat, and thence born up by the like Degree of Heat into the Atmosphere, where they constitute a kind of *Aerial Gun-powder*. And what Dr. Woodward (in his *Nat. Hist. of the Earth*, p. 205, 206.) speaks with so much clearness concerning the Fulminating Damps, is fitly applicable to this sort of Meteor; the Matter of both being the same; and that differing from this in this respect only, or chiefly, that the Matter of the *Fulminating Damp* is sustain'd in the Air of the Mine or Coal-pit by a lesser Degree of Heat, this of *Lightning* is taken up into the Atmosphere by a greater Degree of Heat. And give me leave to add, — The Matter of the *Aurora Borealis* exhal'd into the Middle Region by a still Greater Degree of Heat.

This *Mineral Matter* which arises in Separate Parcels from the Earth, and in a considerable Quantity assembling more Closely in the Atmosphere, becomes, upon being enkindled by the Heat that then accompanies it, a quick, active, and forcible Fire, which striking thro' the Ambient Air, or thro' the Cloud that encompass'd it, with great Celerity, is what we call *Lightning*, as the Cloud and great Noise that usually attends it, has the Name of *Thunder*. Whereof the Cause is the Discharge or Explosion of this Fire from a Cloud; which as it is more or less Compact, and the Fire breaking

forth of it is more or less forcible, the Noise is accordingly greater or less. When a great Quantity of this inflammable Matter is assembled, and takes fire at once, it occasions a Noise like that of several Great Guns discharg'd at one and the same Time.— When it lies in a thinner and more dispersed Collection, or in separate Parcels, and is by little and little, or successively attended, it occasions a *Noise* resembling that of Peals or Vollies which are made by a *Running Fire* (as they term it) of several smaller Guns discharg'd in a Train one after another. When the Cloud is of such large Extent, and withall so Compact that the Fire, tho' strong, is unable to break thro' it, it occasions a deep and rolling Noise, not attended with Lightning, the Fire being spent by Degrees in the Bosom of the Cloud.

There are other more harmless Meteors of the fiery Kind (says Mr. *Morton*, p. 348.) which are not to be pass'd by without some Remarks. *Sept.* 20. 1676. about Seven o'Clock at Night, or soon after, was seen an unusual *Meteor*, by some call'd *Draco volans*, in *Northamptonshire*, and the Neighbouring Counties: whereof we have a short Account from Dr. *Wallis* in the *Phil. Trans.* N^o. 135. p. 863. ——— About 7 at Night (says he) appear'd a sudden Light, equal to that of Noon-Day, so that the smallest Pin or Straw, might be seen lying on the Ground. And above in the Air, was seen (at no great Distance, as was suppos'd) a long Appearance as of Fire, like a long Arm (for so it was describ'd to me) with a great Knob at the End of it; shooting along very swiftly: And at its disappearing seem'd to break into small Sparks, or Parcels of Fire, like as Rockets and such Artificial Fire-works, in the Air are wont to do. 'Twas so Surprising, and of so short Continuance, that it was scarce
above

above Half a Minute. This Fiery Meteor might be a *Draco volans*, or some small *Comet*, becaule it was seen in most Places in *England*. Dr. Plot (in his *Nat. Hist. of Stafford-shire*, p. 20.) calls this Meteor *Capra saltans*, which (as it were describ'd to him) appear'd like a great Fire at a Distance, but coming nearer, its Form and Motion were plainer, it being of a Globular Figure, moving by Jerks, and making short Rests, at every one of 'em letting-fall Drops of Fire, which were part of its Body, for it decreas'd in Magnitude the farther it went, and the oftner it drop'd; so that it wholly disappear'd at about Three Quarters of a Mile distance.

The afore-mention'd Mr. *Morton* (in his *Nat. Hist. of Northampton-shire*, p. 349.) proceeds to give us an Account of some more *Meteors*, one that was observ'd in *Sept.* 1693. The Top of which was in the Form of the Letter W: and had a List or String of Light appendant to the lower Part of the W, about a Yard and a Half in length. It continu'd some time, and was seen by several round the Country.

In *August* 1699. was observ'd, a Globe of Fire, of surprizing Brightness and Magnitude, in the Western Part of the Hemisphere, a little after Sun-setting. It struck downwards in an Oblique Line, and disappear'd, when it came almost as low as the Horizon. In or near the Place of it, there succeeded a narrow List or Stream as it were of a Fiery Smoak, about 35 Degrees in length, which continu'd compact and unbroken the Space of almost Two Hours. Towards the Close of it, it became somewhat Winding or Curled. At length it was broken, or dispers'd by Clouds that pass'd that Way.

Somewhat more observable are those seeming Burnings of the Air, or very bright Illuminations,

which Two following Relations inform us of. At *Higham-Ferrers* in *Northampton-shire*, Jan. 28. 1699, about Half Hour past 5 in the Morning, appear'd on a sudden a more than ordinary Light, like a Flash of Lightning, but of longer Continuance, much out-shining the Light of the Moon, which till then was clear. It continu'd over *Higham* about the Space of a Minute, and seem'd to move from *East* to *West*. And about Five a Clock that very Morning was seen at *Plymouth*, a prodigious Light in the Firmament, of which perhaps this in *Northampton-shire* was a Part.

The other Relation is as follows, Dec. 18. 1707, about Eight o' Clock at Night, the Wind being Westward (a brisk Gale) and the Sky serene and clear, there appear'd at *Fenshed* in *Northampton-shire*, a Brightness in the Air, which made an Arch from North-West to North-East, equal to that which the Sun makes at the Winter-Solstice, extending it self from nigh the Bottom of our Hemisphere, to nigh the Two Pointers of *Ursa major*. The Light was Pale and of a Silver Colour, so Light that all the Stars within the Compass of it, unless 1 or 2 of the first Magnitude, were not to be perceiv'd, being overcome by the greater Light; which, as far as it extended, was equal to that of the Day. There was a dark Cloud which lay, as it seem'd to us, along the Horizon, from one End of the Brightness almost to the other, and about Half a Degree Diameter. There was another long dark Cloud, of a Cylindrick Figure, which lay Horizontally, and seem'd to divide the Brightness into Two almost equal Parts. It had little or no Motion, tho' the Wind blow'd brisk. But on a sudden there appear'd a swelling Brightness in that Cylindrick Cloud, which broke out into Flames of a Pale-colour'd Fire, that spread themselves very far Southwards, and very

very nigh the Bottom of the Northern Part of our Hemisphere. The Flames lasted not longer than Half a Minute, and then were carried East-ward, and soon vanish'd. The Cloud from whence they proceeded still keeping its first Position, and not diminish'd. It was wonderfully frightful and amazing. The Brightness also was very strange, and continu'd till 11.

Somewhat parallel hereto Mr. *Stow*, the Judicious Old Chronicler, relates from his own Observations. About Mid-night, Nov. 14. 1574. Fire and Smoak were seen to proceed from a Black Cloud in the North. The following Night the Heavens seem'd to be all on Fire; and over our Heads (says Mr. *Stow*) the Flames from the Horizon did meet, and there roll one in another as in a Furnace, in a marvellous raging manner.

There is no room (says Mr. *Morton*) to suspect the Credibility of the two former Relations, that from *Higbani*, and that from *Finshed*. All I wou'd farther enquire, is, Whether these Extraordinary Splendors in the Air do not usually happen at or nigh the Time of *Tempestuous Winds*; the Agent that produces them, perhaps, bearing forth from the Earth a considerable Quantity of subtiler and purer Igneous Matter, as the Heat which is discharg'd out of the Earth at the Time of Earth-quakes, educes and bears up along with such a Quantity of several Kinds of Mineral Matter, as to thicken, discolour, and darken the Atmosphere. (*Vid. Dr. Woodward's Nat. Hist. of the Earth*, p. 202.) That these unwonted Illuminations appertain to the Igneous Tribe of Meteors, appears by several Circumstances, and particularly by that of the Eruption of Flames from out of the Black Clouds. And to me they seem constituted of a thin and dispersed Collection of the Parts of Fire, of Quantity

tity and Strength sufficient to enlighten the Air, especially if serene and clear; tho' not to heat it so, that the Senses can discover any more than an Ordinary Warmth in it, tho' perhaps a Thermometer might.

Since my writing my Thoughts upon the late *Phenomenon*, I find a certain Author has publish'd a Pamphlet, entituled, *An Essay concerning the late Apparition in the Heavens, on the 6th of March 1715—16. Proving by Mathematical, Logical, and Moral Arguments, that it cou'd not have been produc'd meerly by the Ordinary Course of Nature, but must of necessity be a Prodigy.*

Now, tho' I wou'd by no means derogate from the Extraordinary Providence of GOD, when things cannot be solv'd by the Ordinary Course of Nature; yet I see no reason why we shou'd presently run to Miracles in explaining Natural Events. For this (as a late Learned Author says) breaks the Chains of Natural Providence, when it is done without Necessity, that is, when things are otherwise Intelligible from Second Causes. This is robbing *Peter* to pay *Paul*, to take so much from GOD's Ordinary Providence, and place it to His Extraordinary. Indeed when a New Religion is brought into the World, 'tis very reasonable it shou'd be usher'd in with Miracles; but afterwards things return into their Channel, and do not change or overflow again, but upon Extraordinary Occasions or Revolutions. The Extraordinary Power of GOD is to be accounted very Sacred, and not to be touch'd or expos'd for Our Pleasure or Convenience: But I am affraid we often make use of it only to conceal our Own Ignorance, or to save us us the trouble of enquiring into Natural Causes. We ought to consider that the Course of Nature is truly the Will of GOD, and (as I may so say)

his

his First Will; from which we are not to recede, but upon clear Evidence and Necessity. And as in Matter of Religion, we are to follow the Known Reveal'd Will of G O D, and not to trust to every Impulse or Motion of Enthusiasm, as coming from the Divine Spirit, unless there be evident Marks that it is Supernatural, and cannot come from our Own; So neither are we, without Necessity, to quit the Known and Ordinary Will and Power of G O D establish'd in the Course of Nature, and fly to Supernatural Causes, or his Extraordinary Will; for this is a Kind of Enthusiasm, as well as the other: And no-doubt that great Prodigality and Waste of Miracles which some make, is no way to the Honour of G O D and Religion. 'Tis true, the other Extream is worse than this, for to deny all Miracles, is in effect to deny all Reveal'd Religion; therefore due Measures are to be taken betwixt these Two, so as neither to make the Divine Power too mean and cheap, nor the Power of Nature Unlimited and All-sufficient.

Nor is this Opinion of making a Prodigy of a meer Natural *Phænomenon*, culpable only upon a Religious, but also upon a Civil account. For if it be reckon'd a Prodigy, and some Wonderful thing, predicting some Ill Accident to the Nation in which we live, it may be of very Bad Consequence. Tho' why it shou'd not be reckon'd a Good Omen, as well as a Bad one, or why it shou'd not be Ominous to any other Nation as well as Ours (supposing it observ'd in other Nations as well as This) I cannot imagine. I say, Supposing it reckon'd a Bad Omen to this Nation (most People being apt to fear the Worst) How must we suppose People's Minds prepossess'd with such an Opinion? How wou'd they be (as it were) Planet-struck with a Panick Fear? How fatally Astonish'd and Dishearten'd? Info-
much

much, that shou'd we suppose a Foreign Prince or Potentate to re-invade us, How flush'd (hereupon) with Hopes of Success might the Invader be? And how dismay'd, and already Half-overcome with Fear, the Invaded? And so this Suppos'd-Ominous Phænomenon be of as Bad, as *Merlin's* Prophecy heretofore was of Good Consequence to this Kingdom. For we are inform'd by Mr. *Camden*, that this Old British Prophet prophecy'd, That when a Stout Prince, with a freckled Face, shou'd pass over the Ford call'd *Rydpencarn*, being in a River call'd *Nant-pen-carn*, the *Welch* shou'd be Subdu'd. Which accordingly came to pass; for K. *Henry II.* who pass'd over this Ford, was Freckle-fac'd; And as soon as the *Welch* heard where the King came over, their Hearts fail'd 'em, because of this Prophecy; and so they Submitted thro' too much Credulity. It is not impossible, That K. *Henry* might choose to go over at this Ford, in Strength of this Prophecy, and his Enemies Credulity, the more to facilitate his Conquests. Vid. *Whiston's* Account of this *Meteor.* p. 74.

And as the making these *Phænomena's*, and unusual Appearances in the Air, to be (I know not what) Miracles and Prodigies, is very impolitick, because oftentimes of dangerous Consequence to the State; so likewise the imagining strange Appearances of military Skirmishes in the Air, or Armies of Aerial Warriours disputing in Battle-Array for Victory, is very Foolish as well as Fanciful, tho' so seriously mention'd by some of our old Historians, and too credulously believ'd by the Vulgar. All those fancied Figures of Armies fighting in the Air, and such-like strange Prodigy's, being nothing else in reality, but so many small Clouds of odd, and sometimes indeed strange Shapes, together with Balls and Darts of Fire, or fiery Streaks and Waves,
Light.

Lightnings and Coruscations, terrible enough to the ignorant Spectators. This is the whole of the Matter, and all the rest nothing else but Creatures of their own Brain, and the Product of their own superstitious Imaginations.

But not to insist upon Generals; let us come to Particulars. The Author of the aforesaid *Pamphlet* endeavours to prove that late *Phænomenon* in the Heavens to have been a Prodigy by Logical, Moral, and Mathematical Arguments. The bare mention of his Logical and Moral Arguments may be sufficient.

His Logical Argument *Pag.* 16. runs thus,

All those Things ought in reason to be accounted Prodigies, to which we can define nothing to be superadded, in order to their being distinguish'd for Prodigies, and which we can only explain to be possibly Natural; without any other Foundation of a Proof, but meer Guess and Divination.

But no Man can define any thing to be superadded to this, in order to its being distinguish'd into a Prodigy, or can explain it to be possibly Natural, by any other Foundation of a Proof, than meer Guess and Divination.

Therefore it ought in Reason to be counted a Prodigy.

His Moral Argument thus,

'Tis agreed on all Hands, by the Moralists, that the most probable Opinion is to be follow'd.

Now the most probable Opinion for Ignorant People to follow, is, that this must have been a Prodigy.

Consequently the Opinion that ought to be entertain'd among the Generality of Mankind, is, that it was a Prodigy.

So much, and I think enough, concerning this Author's Logical and Moral Arguments. What I

am chiefly concern'd to take Notice of, is, the *Minor* of his Mathematical Argument, tho' I see no Reason why it might not have been as properly call'd Physical Argument, which runs thus,

'That this *Fiery Apparition* did not act according to the Laws of Nature, is prov'd by Fact and Experience of all that saw it, for after it had blaz'd, the Fire went entirely out, and then lighted again, which is contrary to the Laws of Nature and Reason; for when 'twas lighted, either there was more Aliment capable of maintaining so bright a Flame, or there was not; If there was, how could the Fire naturally be extinguish'd as to appear so? If there was not, how could it naturally light again into as bright a Flame as ever, so many Hours afterwards?

Now this *Minor* I beg leave to deny, by asserting that our *Phænomenon* or Fiery Apparition, did act according to the Laws of Nature; and that it did so, is prov'd by Fact and Experience of all that saw it; For after it had blaz'd, the Fire went not entirely out. Which I thus prove,

If the *Fire* after it had blaz'd went out, and was indeed totally extinguish'd, there must needs have been observ'd something like an Extinction, something of a *Caput mortuum* or Smoak, or as when such like Meteors burst into small Sparks or Parcels of Fire, like Sky-Rockets, and such-like Artificial Fire-works in the Air; or like the *Draco volans* (describ'd by Mr. *Morton*, p. 348. of his *Nat. Hist. of Northampton-shire*) which mov'd by Jerks and made short Rests, letting fall Drops of Fire, which were Part of its Body. This Supposition, any Man that is any thing of a Meteorologist and in his right Senses must surely grant.

But nothing of all these (which are the necessary Concomitants of such extinguish'd Meteors) was ob-

observ'd in our Fiery *Apparition* (or *Apparitions* :) But after it had went its Length, *i. e.* after its Elasticity was spent, and a great deal of its Spirit and Vigour unavoidably diminish'd (as plainly appear'd by its next shorter Stage or Flight) as it at first burst out of one Cloud, so afterwards it was shot into, and embarrassed by another.

Therefore I conclude, that the Fire of this *Apparition* after it had blaz'd, did not entirely go out, and was not totally extinguish'd, and consequently that this our *Phænomenon* or Fiery *Apparition* did act according to the Laws of Nature, as is prov'd by Fact and Experience of all that saw it, and consequently still, that the said *Phænomenon* in the Heavens, might have been produc'd meerly by the Ordinary Course of Nature, and need not rashly be deem'd a Prodigy.

But after all, notwithstanding this Great *Phænomenon* does seem to be nothing else but the Product of meer Natural Causes, yet still, in Contemplating these and such-like Wonderful Works of Nature, we are Naturally led from hence to celebrate and admire the Great *Author and First Cause of Nature*. For Matter, whether we allow it Motion or not, cou'd not come into that Variety of Tempers and Compositions, in which we find it in the World, without the Influence and Direction of a Superior External Cause, which we call the *Author of Nature*. Thunder and Lightning are things (tho' easily accounted for by Natural Causes) that have terrify'd and affrighted the Greatest Monarchs, and even the most Cruel Tyrants, witness *Tiberius* and other Roman Emperors. Total Eclipses (likewise) of the Sun and Moon (tho' their Causes are so very well known, and their Times and Periods stated and fix'd) never fail to excite our Admiration and Praises of the Infinite Creator
and

and Contriver of them, How much more may such Uncommon Appearances force from us such-like Pious Exclamations — O LORD GOD, Thou art become exceeding Glorious! Thou art cloath'd with Majesty and Honour! Thou deckest thy Self with Light, as it were with a Garment, and spreadest out the Heavens like a Curtain, who makes the Clouds his Chariot, and walkest upon the Wings of the Wind! O LORD, How manifold are Thy Works! In Wisdom hast thou made them all, the Earth is full of Thy Riches. Psal. 104.

FINIS.

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